
TECHNOLOGY
approach
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THE NAVAL AVIATION SAFETY REVIEW
NOVEMBER
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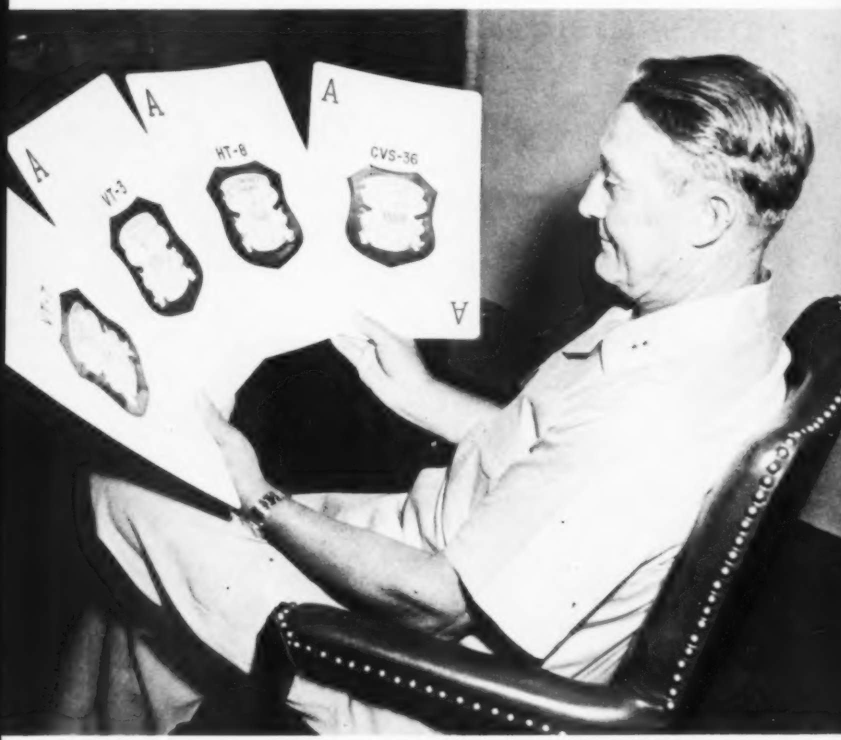
TECHNOLOGY
DEPARTMENT

Many commands and units exhibited a commendable imaginative touch in their releases on the 1960 Chief of Naval Operations Aviation Safety Award Winners. Typical is the following from CNABATRA:



PAT HAND—Rear Admiral Clifford H. Duerfeldt, Chief of Naval Air Basic Training contemplates his dream hand during working hours at the NAS, Pensacola. "Best hand I've ever had," the Admiral said. The four aces, Training Squadron SEVEN, Training Squadron THREE, Helicopter Training Squadron EIGHT and USS ANTIETAM (CVS-36) received the Chief of Naval Operations 1960 Safety Award. All four recipients are part of the Naval Air Basic Training Command.

During the period 1 July 1959 to 30 June 1960, 15,405 arrested and 8697 touch-and-go landings were made aboard the USS ANTIETAM by fixed wing aircraft and 2187 landings were made by helicopter aircraft.

Both VT-7 and VT-3 broke the record for accident-free flying with 36,306 and 97,891 hours respectively. HelTraRon EIGHT flew 40,048 hours with only two minor aircraft accidents for a rate of 0.50.

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IN THIS ISSUE

Pilot vs. Pitching Deck 3
Pocket Guide to Med Weather 7
Truth and Consequences 10
Alaskan Flying 12
Better Wx Advisories Promised 16
Flight Notes 18
Anymouse 20
Headmouse 23
Life Vests 24
Saturday Night 26
Couldt It Be You? 30
Disorientation 34
Flight Surgeon's Notes 35
Reliability 36
Inspection Plans 38
Metal Contamination 40
Maintenance Notes 42
Murphy's Law 47
Clipboard 48

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LETTERS

Runway Overrun Aircraft Warning Device

Sir:

Superimpose a picture of almost any naval airfield used during World War II upon a picture of it as it exists today and the chances are good that the major runway, and perhaps all of them, will be appreciably longer. Post-war high-performance jet aircraft have required more runway for both landing and takeoff than was necessary 15 years ago. Now, check the control tower location. Has it been relocated? Do the control tower traffic controllers have the entire length of the runway in view, both day and night, in good weather and in bad?

At NAS Alameda we came to the conclusion that since the end of Runways 31 and 25-Right were about a mile and a half from the tower, there were times when the tower air traffic controllers were not in positive visual contact with the end of the runways. We considered this especially serious because the runway overrun areas at Alameda are wet! Any aircraft plummeting off the end of these runways creates an emergency requiring immediate attention.

So we developed a runway overrun aircraft warning device. Model I is shown by photo (1). Essentially, this device incorporates an AN-M8 Very Pistol, held in a framework of metal, which pays out line to a post located on the distant side of the runway. Any aircraft overrunning the runway breaks the line and fires the Very Pistol, thus alerting field crews and the control of the emergency.

A second device was subsequently constructed and mounted at the end of Runway 25-Right, as shown by photo (2). This model is considered to be a slight refinement over the first model. Particulars of the device are as follows:

Except for the Very Pistol, which is standard, the device can be constructed from scrap/surplus material. (Non-corrosive metal should be used.)

A line is strung taut between the warning device and a metal upright (pipe/pole/angle iron). The distance from the device to the upright depends upon the width of the runway, plus a "J" factor to allow the pilot an attempt to ground loop to the right.

Because pilots usually attempt to ground loop to the right, the device is mounted on the left end of the runway.

Cellophane/plastic covering is positioned over the Very Pistol barrel to protect both the pistol and the shell from moisture.

When an aircraft overruns the runway it contacts the line. A cutting edge on the device severs the line quickly, allowing the weight to descend, and this weight triggers the Very Pistol.

It is simple—and it works. Ground crews check the readiness of the device periodically each day, as they have occasion to be in the area, and actually fire the device weekly. Any other station having a requirement for a Runway Overrun Aircraft Warning Device, and desiring to work from NAS Alameda blueprints, may write to the Public Works Officer at NAS Alameda. Blueprints will be made available upon request.

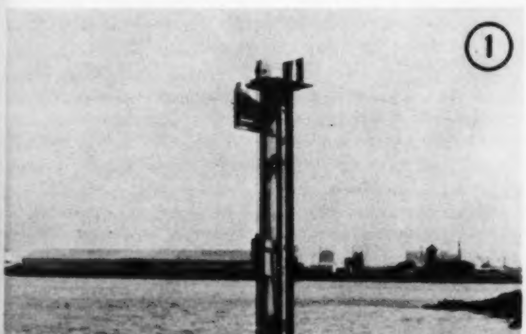
E. L. FARRINGTON
Commanding

Want Underboost Info

Sir:

Recently another incipient HSS engine failure was noted by gradually decreasing oil pressure and metallic particles in the oil strainer.

Investigation disclosed that the



metal particles were from a piston skirt. No indication of detonation or overboost was evident, and the failure was considered more likely to have resulted from an *underboost condition.*

Squadron doctrine has been modified to set detailed standing operating limitations to engine RPM for various flight conditions, in order to reduce to a practical minimum the internal wear and stresses imposed by underboost conditions. It was noted that the only information concerning underboost conditions is available from engine service representatives. No indication as to a possible critical condition exists in present flight handbooks. Further specific information on the effects of underboosting would be highly desirable.

ROTORHEAD

● Please see "Keep the Pressure On," April 1959 issue of APPROACH.

Murphying Murphy's Law

Sir:

It is with deep regret that I bring your attention to page 47 of the September issue of APPROACH magazine. I have always viewed APPROACH without reproach and here I find that Murphy has got to the Safety Center and infiltrated into an outstanding magazine. I wish to reword Murphy's law a little bit to fit the situation. "If an aircraft part (picture) can be installed (captioned) incorrectly, someone will install (caption) it that way!" Notice the discrepancy between the caption of the two pictures and the narrative accompanying it.

C. T. PERKINS, M/SGT
3D Marine Aircraft Wing
MCAS, El Toro.

● See answer next letter.

Sir:

Murphy's Law can be applied in many areas. Photo placement page 47, Sept. '60 APPROACH, for instance?

AUSTIN V. YOUNG, LCDR

NROTC, Northwestern Univ.

● The photo numbering is incorrect. These should have been reversed. We stand corrected. A host of other readers detected the mistake too. Thank you, sirs, for bringing the error to our attention.

While we cannot agree the error is an application of Murphy's Law which deals with aircraft parts, we hang our heads and take our place among the Dilberts. That is, "If something can be done incorrectly, someone will do it that way."

Secret Told

Sir:

Re: "This Report Is Puzzling," page 44, August issue of APPROACH: The article is recognized as being drawn from our Jan 1960 "Station Operations Newsletter" publicizing a growing concern over the damage being done to flight line fire bottles. The effort to curtail, or eliminate this damage is proving successful. A 75 percent decline in the number of damaged bottles was noted in comparing the figures of first six months of 1960 to those of the first six months of 1959.

Personnel on this station undoubtedly tried harder to protect the fire bottles but a decided effort was also made to repair fire bottle racks, and replace those beyond repair.

This information is furnished in order to complete the story and to point up the fact that substantial improvements can be made with a minimum of effort, if the effort is well directed. It is hoped that the Navy-wide response to your article will be as rewarding as it has been at NAS Alameda.

E. L. FARRINGTON
Commanding Officer

● It is APPROACH'S policy to reveal trouble areas without linking individuals, stations, ships, units, etc. to them. "If the shoe fits," it is expected the unit, or station, as the case may be, will analyze same and take appropriate action.

This brings to mind the ANYMOUSE report of a flight leader's behavior during a flyby which resulted in a group grope. No less than a half dozen squadron commanders confessed in taking APPROACH to task for printing a report criticizing *him* personally. NAS Alameda's efforts to correct this particular problem is noteworthy. Like you, we hope others cope with this problem as successfully.

Army Foot Gear

Sir:

Fate and BUPERS have placed me here at Fort Bragg with the Army for three years (like a fish out of water), and although people generally don't understand the terms bulkhead, deck, or head, they do have a pretty good appreciation of the problem of foot gear. Although these airborne types spend a great deal of time riding in trucks, sitting in C-123 or C-130 aircraft, and hanging under T-10 parachutes, they do spend enough time stomping through the cane brakes of North Carolina to realize that a good pair of shoes can be worth their weight in gold.

Apparently the Army quite some time ago gave up the field shoe, such as the standard 1310 wears for flying, in favor of a finished leather, three quarter length boot which is stocked by the Army Quartermaster at the going price of $7.35. Of course the really sharp paratrooper buys his at the PX and pays about $15 for a little extra in the quality department. The boots now coming into the Army system have steel toes which might be of interest to those flying "toe-clippers."

I purchased a pair of these boots last fall to use in a field problem and then began using them for flying. I also noticed at that time that the Air Force wore these boots and many people had a pair of 10 inch zippers sewn into the boot so they could be removed quickly if necessary. Of course the zippers do nothing to improve the water tight integrity of the shoes but then I've yet to see a pair of leather boots that were water tight anyhow. The local cobbler provides the zippers and completes the modification for $2.50.

In summary I think that this boot far surpasses the field shoe from the survival point of view, it offers greater protection from snake bite, is very comfortable, and looks a bit more respectable in that it is finished leather and will take a shine. If anyone has access to an Army installation and can see their way clear to part with the necessary cash, I believe that they will find these boots a welcome addition to their flight gear. Of course there is one drawback in the construction of this footgear that I have been reluctant to mention—these boots are, if you'll pardon the expression, "Blackshoes!!"

R. B. GOHR, CDR

Hdqtrs.
USA Special Warfare Center

● BuWeps informs us that there would be 8000 Iron Age Safety Flying boots (without the zipper) available in the supply system in October.

THE PILOT vs. THE PITCHING DECK

by
Lcdr. A. J. Newhoff, CVG-3, Senior LSO

HOW many times have you heard your skipper or LSO say, "Okay fellows we've got a little pitch today so let's watch it." And how many times have you wondered; watch what, what do I look for, and more important what do I do?

Well before we get into flying down the glide slope and landing on a pitching deck, let's discuss the carrier approach under normal conditions.

Just about all carrier pilots have heard of angle of attack and most of the ones I've talked to say they use it. But do they really?

I happen to know that some experienced pilots use the angle of attack system only when everything is on, but when making corrections they revert back to airspeed. How many other experienced pilots are guilty of *thinking* they are flying angle of attack. Here's one way of finding out, and also to develop confidence and experience in using the system. Next time you go out on an FCLP flight put some paper over your airspeed indicator, taxi out, take off and stay in the FCLP pattern using the angle of attack indicator and indexer alone. If you can do this—you're an angle of attack convert.

Okay, now that we have you flying angle of attack let's see how you use it in a carrier approach.

A recent APPROACH article stated that if you're not set up at the 180 go around, so let's set up at the 180. By the time I reach the 180 I like to have the airplane trimmed up hands off with a "DONUT" showing on the indexer. If you can picture yourself on an infinitely shallow glide slope as you start your turn on base, you can start thinking about altitude control with power. As you start your turn, you lose some of your lift and you begin to go low on the "glide slope." If you use your longitudinal control and pull back on the stick you increase your angle of attack above optimum, and may settle more. However as you see yourself dropping low; you add power, hold angle of attack constant, increase airspeed, increase lift, and stay on altitude.

Now as you approach the optical glide slope and the meatball pops into the middle of the mirror, you wait until it starts to drift high and then reduce your power until you stop the meatball. You are now descending on the prescribed glide slope. You will notice that at no time did we control our level or optical glide slope, with longitudinal control. In fact if it were possible to trim the airplane precisely; once you've trimmed for your approach angle of attack any movement of the meatball will tell you that a power change is required. Also if you find that you are easing a little forward pressure on the stick to keep the ball centered, you are carrying too much power—back pressure, not enough power. Now that we are properly established on the glide slope let's examine what the optical landing system does for us with a pitching deck.

Continued next page

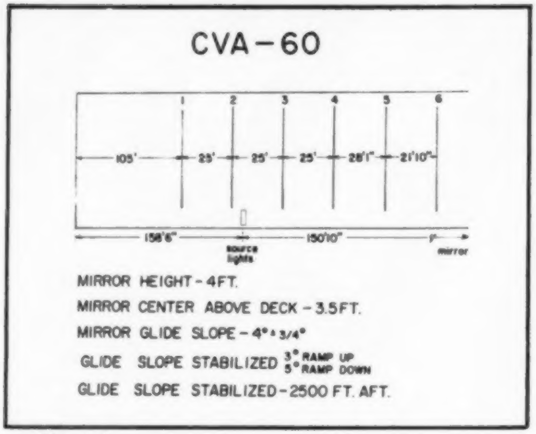


Chart 1

F8U

HOOK TO EYE (APPROACH ANGLE OF ATTACK)		12
HOOK / RAMP CLEARANCE		12.9'
HOOK TOUCHDOWN		184'
MAX ENGAGING SPEED		110 KTS
MIRROR SETTING		0
MIRROR CENTER ABOVE DECK		3.5'
SINK SPEED	DESIGN	17 FPS
	LIMIT	20.8 FPS
MAX DECK PITCH TO REACH DESIGN SINK		
110 KTS ENGAGING SPEED		1 1/4° RAMP D
105 KTS ENGAGING SPEED		1 1/2° RAMP D

Chart 2

The following charts and numbers pertain to the F8U and USS SARATOGA, but the principle applies to all aircraft and carriers. Chart 1 gives us the layout of the SARATOGA. Let's look at a few points of interest. The stabilization system will handle deck pitch from 3° ramp up to 5° ramp down and 12° of roll; it will not compensate for heave. This does not mean that a pilot could land under these conditions. He'll hit the ramp at 3° ramp up and have a disastrous sink rate at 5° ramp down. It does mean that he will be able to fly a smooth approach on the glide slope up to the point where the LSO makes the land or wave off decision. Incidentally a 1⅛° pitch on the SARATOGA is approximately 12' of ramp movement.

What does the pilot see when he is on glide slope and the deck is pitching and rolling within stabilization limits? First of all, since the mirror is stabilized at a point 2500' aft of the mirror, the meatball will tend to drift slowly whenever the pilot is at any other point on the glide slope. This drift is very gentle and should not affect the pilot's pass. However if the deck is pitching beyond the stabilization limits the meatball will suddenly *snap* off the mirror and then return as the deck moves within stabilization limits and then *snap* off the mirror again. The pilot should call the LSO and tell him the meatball is erratic and continue his approach utilizing radio or paddles. Since it is necessary to use more descriptive phraseology during a pitching deck talkdown the pilot should follow the LSO instructions implicitly. Practice talkdowns at regular intervals while embarked improve LSO vocabulary and pilot reaction.

Chasing the deck during the old days used to be a problem because the pilot concentrated on the LSO who was located near the ramp, but with the mirror further up the deck this problem is somewhat reduced. This tendency still exists for the pilot who tries to line up on the ramp, particularly during a talkdown approach. Pick a spot amidships, where the deck is steady, for line up reference.

Okay, now that we understand the limitations of the mirror, let's analyze some approaches to a steady and pitching deck. I'll use an F8U in the groove under the following conditions; optimum angle of attack and engaging speed of 110 Kts.

Chart 2. Here are the data for the *Crusader* under the aforementioned conditions. An important number is the distance from the hook to eye, measured perpendicular to the deck. Since the pilot's eye is fixed to the glide slope any increase or decrease in angle of attack will increase or decrease the hook to eye distance. This is not too significant except that it inversely affects the hook to ramp clearance. In other words, the further you pull back on the stick (increase angle of attack) to stay on meatball the closer the hook gets to the ramp. And when the ramp is also moving up, you're in trouble. The last item on this chart is important both to the pilot and LSO. With the deck displaced by the indicated number of degrees, but steady, the LSO can accept the F8U without breaking something. The lower the gross weight or with increased wind-over-the-deck the less the engaging speed and the greater the amount of acceptable pitch. By knowing these limits and checking with DC Central for maximum deck pitch the LSO can better advise the Captain on safe operating conditions.

Now let's examine various passes and talk about the significant points of each.

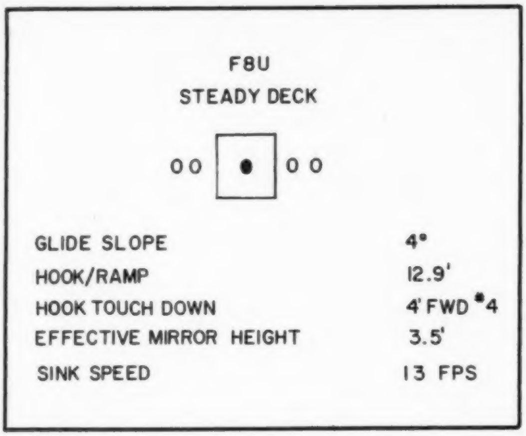


Chart 3

Normal everyday pass that an F8U carrier pilot should strive to make.

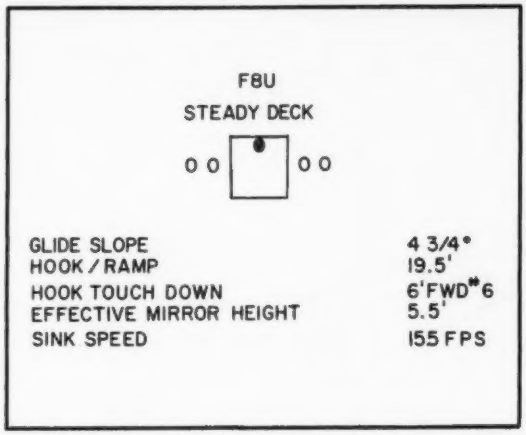


Chart 4

Here's the pilot who flies a consistently steady pass but with the meatball riding high. If he holds what he has he is going to bolt. He will never hit the ramp, but look at his sink rate. If he feels he is too high at the ramp, just one small DNAR (drop nose at ramp) and he's going to exceed the design sink.

Now let's look at a pitching deck, and the pilot who flies a roger pass. For simplicity's sake we have stopped the deck at the indicated positions.

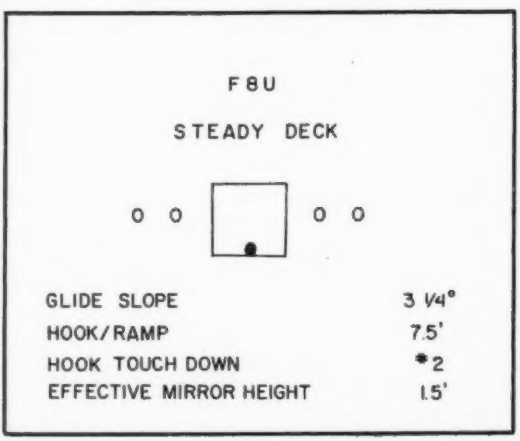


Chart 5

Here's the pilot that can't stand the thought of bolting. Look at his hook to ramp clearance. A little back pressure on the stick to center the ball further reduces this clearance. Hook touchdown is at No. 2 cross-deck pendant, and yet certain pilots will say that they had the ball right in the middle. Who are they trying to kid?

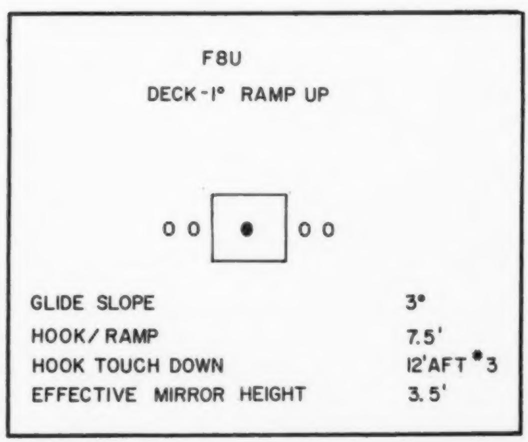


Chart 6

The relative glide slope has decreased due to the pitch and with a corresponding decrease in hook to ramp clearance. Hook touchdown and sink speed okay. Don't pull back on the stick when you see the ramp up, it only tends to decrease your hook to ramp clearance and increases your chances of leaving the hook point on the ramp.

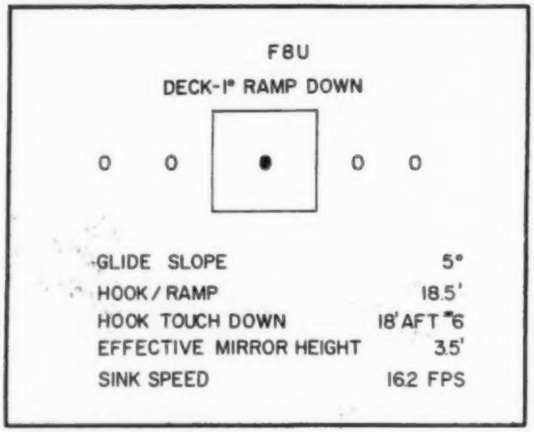


Chart 7

Glide slope has increased to 5°. Sink speed has been increased almost to design sink. Your hook is still in the wires. But look at the hook to ramp clearance. Six feet above normal. To the uneducated carrier pilot this is unnaturally high. His natural tendency is to drop his nose just a little. Up goes your sink rate and you're in trouble. Hold what you have and don't let the ball start drifting down.

Now let's get to the pitching deck and erratic carrier pilot.

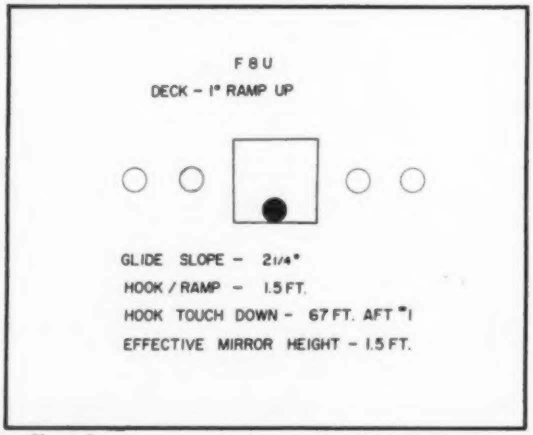


Chart 8

The relative glide slope is shallow because of deck and meatball position. Nice easy landing with minimum sink. That is providing you get over the ramp. 1½ feet to play with, I don't know about you but I'm not that good. This is also what the LSO refers to as TT1 (taxi to No. 1 wire).

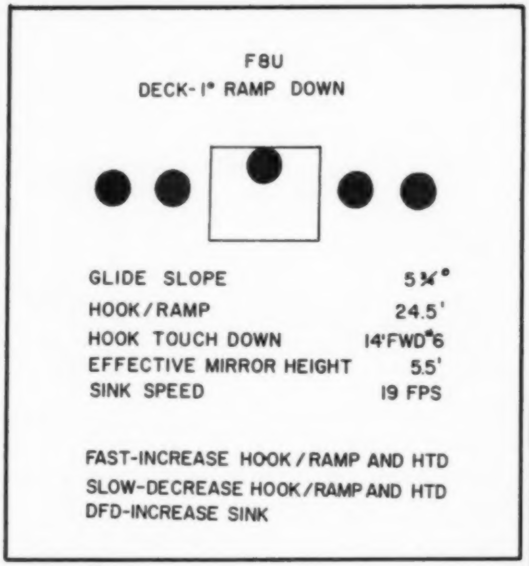


Chart 9

Here we have the pilot who is going to outsmart the pitch by flying well clear of the ramp. First the glide slope is increased by 1¾° over normal. Second, he has exceeded design sink and third he won't even catch a wire. Furthermore, he is almost double his normal height above the ramp and set up for a good DFD. In other words to avoid hitting the ramp he has set up a bolter in an airplane that may be subjected to high sink damage.

I have discussed only certain maximum conditions and although you can devise as many different combinations as there are Naval Aviators, the basic principles of a good carrier approach remain unchanged.

They are:

1. Trim up hands off at the 180 for the optimum angle of attack.
2. Use power as the primary altitude control.
3. Line up using a reference point amidships.
4. Advise the LSO whenever the meatball is erratic.

When near the ramp control meatball position with *power only* and remember that the worst that can happen with a meatball drifting high is a bolter.

(Note) Landing Signal Officers can make up their own charts for their particular carrier and aircraft using information contained in recent aircraft recovery and mirror bulletins.

A POCKET GUIDE TO MEDITERRANEAN WEATHER (ABRIDGED)

By A. C. GLENN, Lt(jg), USN, (Ret.)

These quotations, for the most part, came from jotting down passages while reading various books, mostly fiction, and more often than not, stories of sailing vessels. Some of the proverbs are quoted from memory and are from unknown sources.

All in all, whether one uses proverbs or modern methods, an attempt to forecast weather in the Mediterranean Sea is ridiculous.

"Murphy has a weather eye,
He can tell whene'er he pleases
Whether it's wet or whether it's dry,
Whether it's hot or whether it freezes."
—*Murphy's Almanac*

What Murphy can do we can do!

Continued next page

"Meteorology is an exact science."

—*Lane*

"Meteorology is not an exact science."

—*Nathaniel Bowditch*

"Literacy has helped seamanship very little."

—*Samuel Eliot Morison*

Sam has probably been reading Bowditch and Lane.

"I wonder how one Haruspex* can look another in the face without laughing."

—*Cato (Roman Senator)*

*Weather forecaster.

No comment.

"Competition between forecasters results in cockpit fog."

—*Glenn*

. . . *And lower quarterly marks for the junior forecaster.*

"Three types of approach have been favored in making extended forecasts:

A. Statistical approach

B. Meteorological approach

C. Mystic approach used by 'pseudo-scientists', 'charlatans', and persons on the 'lunatic fringe'."

—*Horace R. Byers*

Yeh, but we object to being called charlatans or pseudo-scientists.

"Do not ignore meteorology for it is a science closely allied to medicine."

—*Hippocrates*

Gee, are doctors as wrong as I am?

"When the locks turn damp in the scalp house surely it will rain."

—*American Indian Proverb*

Blonde ones are more reliable.

"As the bee is drawn to the honey flower, so is the aviator drawn to centers of low pressure and accordingly is vexed at being refused VFR weather."

—*Glenn theory*

Oh well, I'll be out on "thirty" pretty soon.

"Girl guides are encouraged to take with them on camping trips a jar with a leech in it. If unsettled weather is in prospect, the leech will crawl slowly to the top of the jar and remain there until the weather settles. If a storm is coming the leech moves back and forth frantically. In fair weather it curls up on the bottom and sleeps."

—*Girl Guides Handbook*

Does it snore?

"Place shark oil in an open bowl; if the oil turns cloudy, a storm is imminent. If the oil remains clear, fair weather is in store."

—*J. R. Hubbard, BMC, USN*

"Sharks go out to sea at the approach of a cold wave."

—*Unknown*

To get their oil changed?

"Porpoises go 'head to the wind.' "

—*Sailors' lore*

Follow that porpoise, Captain!

"When it is evening ye say, it will be fair weather: For the sky is red. And in the morning, it will be foul weather today for the sky is red and lowering."

—*Matthew 16:2:3*

A universal rule also found in French, Greek, and Italian.

"Zeus, most glorious, most great god of the storm cloud."

—*Odyssey of Homer*

"He commandeth and the storm wind rose and the surges of the sea."

—*Odyssey of Homer*

The quotation above referred to Zeus. Elsewhere in the Odyssey, storm and calm at sea were under the control of Poseidon. Whoever had charge of the wind in the Mediterranean apparently didn't know what he was doing.

Carrier skippers should submit a 307 for a steerhide full of the four winds, releasing each one as it is needed for flight ops.

"No Zeus have we there, but a vortex of air."

—*Aristophanes*
"Comedy of the clouds"

Science rears its ugly head.

"Thor launched the thunder, presided over the

air, winds and the seasons."

—*Norse mythology*

But not in the Mediterranean, thank goodness.

"Cumulus clouds which move from land out over the ocean in summer will dissipate in from five to thirty minutes."

—*Weatherwise*

"Beware not so much a darkling cloud from the land as from the sea in summer."

—*Weather proverb*

Agreed.

"If the wind backs and the weather glass falls, be on your guard against gales and squalls."

—*Proverb*

Do not ignore this proverb. At 1000, 4 April 1956, a light wind set in from the southeast in the area to the west of southern Sardinia. At 1300 the wind began backing toward the east and at 0100 on 5 April, it had reached north at 14 knots.

During this 15 hour period the pressure fell from 1011.3 mbs to 1004.3 mbs. Nine hours later, gales set in from the northwest and continued for 40 hours, ending only when the USS INTREPID *came under the lee of the French coast east of Toulon.*

While this storm was in progress, it was noted that in all instances when the wind veered by as little as 10 degrees a drop in velocity would occur and last for 2 or 3 hours. When the wind backed again, the velocity would immediately pick up to gale force.

"A wind direction other than east or west in Alboran Channel should cause scrutiny of the current synoptic chart for a disturbance in that vicinity."

—*Glenn*

And what the "lunatic-fringe" sells I'll buy.

"Small boating is difficult in Tangier in May with an east wind.
Rough seas are rare with southeast and south winds."

—*Weather in the Mediterranean*

"In the spring, poorest visibility at Tangier occurs with a south wind."

—*Ditto*

Picking your wind depends on which type of trouble you want.

"Rain showers before seven
will end before eleven."

—*Proverb*

"A sunshiny shower
never lasts half an hour."

—*Proverb*

And if that misses the forecast, claim that the ship zig-zagged.

"If a moderate to heavy shower occurs, the air temperature will fall to the temperature of the wet bulb preceding the shower."

—*Horace R. Byers*

Department of useless information.

"A blustery night, a fair day."

—*Herbert*

One forecast based on this scored 100 per centum.

"You may look for six weeks of weather in March."

—*Unknown*

"The visibility is so good you can look three days ahead."

—*Also unknown*

I wish I had said both of them.

"Alto-cumulus of ragged appearance in patches over the sky in the Mediterranean foretell an increase of wind within 24 hours."

—*Glenn*

"All signs fail in dry weather."

—*Proverb*

This cancels all other rules unless it is raining.

Must we justify the apparent levity with which we observe the vagaries of Mediterranean weather? Our motto is "If you can't lick it, laugh at it."

One reason skippers get frustrated is that we don't miss *all* our forecasts. But no one puts more thought and study into the missed ones than we do.

To you Weather Birds who follow in INTREPID's wake, we wish only "fair weather cumulus" and enough wind so you don't have to go around and around for it like a puppy chasing its tail. ●

DON'T SKID YOURSELF!

IT WAS dark and raining as an F4D pilot came down the GCA glideslope and broke out under a 400-foot ceiling. Relative wind was 110 degrees left of his runway heading at eight knots but the ceiling was too low to permit a circling approach. Touchdown on the wet concrete was made in the first 500 feet of runway at 130 knots.

Immediately upon touchdown he flamed out his engine, opened speed brakes, ran pitch trimmers full up and held the nose wheel off the deck for aerodynamic braking. Along with all this the pilot also began rapid alternate wheel braking (to prevent skids or blown tires) but there was no appreciable deceleration.

His next action was to drop the nose wheel to the runway and try simultaneous wheel braking: Nothing more significant than a nose-left skid developed from this. Runway length was 7500 feet and the squadron "decision point" for taking the arresting gear was the 3000-feet-to-go marker, located a little more than 1000 feet from the cross-deck pendant. At 80 knots or above when passing the 3000-foot marker it is mandatory to drop the hook. At lower speeds, depending on the braking action encountered it is optional.

The aircraft still remained on the runway when passing the "decision point" and the pilot dropped the hook. His F4D en-

A CO's Reflection of a Wheels-Up Landing

"The real solution lies in pilot acceptance of the fact that there are no significant external aids that will prevent mistakes. The ultimate solution rides in the cockpit along with the pilot."

gaged the wire still in a slight skid, and was stopped without damage.

The problem of jet stopping distances on wet runways has been with us a long time and the F4D seems to be especially troubled when things (windscreen and runway) are wet. Without field arresting gear this particular airplane would most likely have ended up in the mud. Squadron doctrine for a wet runway landing requires a touchdown in the first 1000 feet not above 140 knots followed by flaming out the engine, aerodynamic braking and rapid alternate wheel braking.

A review of records at one headquarters shows that wet runway landings in the F4D follow identical patterns; blown tire shortly after touchdown, uncontrollable swerve, and off the side of the runway. More tires are blown on wet runways than on dry runways. This indicates pilot braking technique is an important factor. In some squadrons wet runway landings are not to be attempted unless field arresting gear or Morest will be used or an emergency situation exists.

Portions of a Douglas Aircraft technical report which refer to the problem are quoted: "Aerodynamic braking on wet runways is superior to mechanical braking. This is most emphatically pointed out in reports involving landing accidents on wet runways where the pilot believes his brakes have failed where in reality one or both are locked. In this condition a tire will blow and the aircraft swerve from the runway. Contact with ground obstacles usually follows. On wet runways the brakes are less effective, give the pilot a different sense of deceleration in proportion to brake pressure applied as compared to dry runways, and when the pilot adds more foot pressure to acquire equivalent deceleration the brakes lock, the wheels slide, and the pilot thinks the brakes have failed.

It is recommended that presently published procedures for braking be used. It is well to note that the landing rollout distance for an F4D on wet black top runway is increased 100 percent over distances shown in confidential section of flight manual in figure A-20 on page 138 of 15 Dec 58 revision.

Quick—Sweep It Under the Rug!

"It is regretted that photographs are not available. This is due to overzealous personnel who cleaned up the mess of the disassembled valve on a work bench while the investigating officer absented himself to telephone for a photographer."

Reliability & Typography

Caught in passing—

. . . The use of printed circuits, derated components, silicon transistors and diodes in the system make for minimum reliability and minimum weight . . .

Now we know!

Despite the possibilities of incurring only minor damage with a jet wheels-up landing, it is not an accepted method of saving wear and tear on the tires. This one happened in broad daylight, with CAVU weather and light traffic. Both pilot and tower operator remember the transmission as "turning base, wheels down." The tape recording reveals the pilot actually saying "turning base, wheels up." Nobody caught it in time.

By CDR Gilbert T. Joynt

SOME COLD FACTS ON ALASKAN FLYING

Lines and numbers indicate the annual number of days with VFR weather.

MAKING a flight in the Alaskan area? Here are a few generalities about it, or almost any other north latitude area of operations. Nothing new is printed here but it may bring something to your attention for the first time and give you perhaps a little more confidence in the northern latitudes. Let's start with the weather.

To try and tell about Alaskan weather and cover the subject would be almost as difficult as trying to explain weather of the United States to someone south of the equator. It's diverse and varied but we have in mind only generalities.

On the coastal side of any Alaskan mountains, thunder and lightning are seldom encountered. You may get occasional buildups during early summer months but it is not common for the forecaster to list thunderstorm activity along the north Pacific Coast unless he can base it on some pilot reports. Along the west coast and north coast areas you can expect buildups but nothing as intense, extensive or as frequent as those encountered in the U. S. during the summer months. However during the summer, nearly all Alaskan central interior regions can produce real thunderstorms, often accompanied by hail. Some of these storms are like those of the western states in the Rocky Mountains where lightning causes forest fires without enough rainfall to subdue them.

Icing can be encountered at altitude almost any month of the year. The most numerous ice reports come from the coast routes to the States, partly because there are more flights through this area than elsewhere. More frequent and intense ice is produced from September through December. Alaskan ice should be treated like ice anywhere. Do something about your situation as soon as possible.

Get an altitude change, reroute your flight or determine from airways communications that the condition is localized before continuing the *status quo*. Promptness is a virtue here.

Temperatures

In southeast Alaska and at other Pacific Coast locations, the temperature range is not extreme. At sea level you can encounter temperatures as low as minus 20° F. and as high as plus 80°. The average for January is going to be in the mid-30's and in July around the mid-60's.

The greatest temperature extremes occur in the interior of course—a minus 60° F. to a plus 85° F. Along the Arctic coast it seldom gets colder than a minus 40° F. but wind chill from the breezes that usually blow all along the Arctic Coast can make 10° above seem like 40° and 50° below.

Summer temperatures in Alaska present very few problems. Winter requires preparation and planning. Winter cold and winter flight operations have been under study since the airplane was first used in the Arctic and the study is continuing. Much of the published work should be required reading for any outfit going to Alaska in the winter. You will find the military has recorded and has available many articles on the subject.

Whenever extreme minus temperatures prevail you can expect inversions. At Fairbanks for example, when it drops to minus 40° or more, a rise in temperature of from 20° to 30° will be encountered in the first 2000 to 3000 feet above ground. This temperature inversion is common knowledge and is relied upon by the small plane operators when they have to operate in extremely cold weather. They go up to get warm. The in-

version can be so pronounced that it has been known to shatter the windows in light aircraft which are making descents into airports where the temperature is as low as minus 50°.

Fog is generally associated with calm or light wind conditions but if you are in the Arctic, along the Bering Sea coast or in the Aleutians don't believe it. Conditions of rain and fog, or snow and fog, have existed in winds above 40 knots. North Pacific Coast fogs behave generally like most coastal fogs except they may be a little more persistent. They will usually dissipate over land masses with increasing sunlight unless there is an accompanying overcast.

Ice fog is phenomena usually associated with interior areas and sub low temperatures. Ice fog requires near calm wind conditions as a rule. It may be as thin as 30 to 50 feet deep and as deep as several hundred feet and it may only obscure parts of the landing area. In ice fog there is usually good vertical visibility and zero horizontal visibility; the same as a dust storm where you can see airfield details from altitude but lose sight of everything at low altitude. With ice fog don't expect to land right after an aircraft has just taken off and above all don't make low passes over the runway before landing. Water vapor in the exhaust becomes ice fog and the slip stream causes further disturbance and distribution of it. As a result you look the runway over all right but when you turn final you find the runway has vanished.

The good weather you can handle. Bad weather is complicated by mountain ranges, and more mountain ranges. Timberline is at a lower elevation than in the southern 48 states and pine meets glacier on the western coast. Slick runways and "braking action poor" are common fare in winter.

Winds

Like most areas in higher latitudes, Alaska is an area of great contrast in wind conditions; from raging storms of fall and early winter to prolonged periods of calm or light and variable winds of spring and summer. The coastal areas including the Aleutians receive winds of greater frequency and intensity than do the interior points.

The forces of the winds are intensified with the lowering of temperature. During the winter, when the weather is clear for prolonged periods, the calm or undisturbed cold air mass of the interior will get colder each day. If a storm center or low pressure pattern does not penetrate to the interior, this air begins to react like a body of water and flows toward the coast through every drainage point. The drainage points (valleys and passes) create a localized name for this type of wind just as the Santa Ana of Southern California. They are normally easy to forecast and do not constitute a problem unless the condition persists for prolonged periods in which case severe turbulence will extend up to airway altitudes and spread over wider areas.

Nav and Communications

Alaska has over 8000 miles of airways with a very elaborate nav aid system throughout the state. In conjunction with the military, local airlines and Coast Guard, there is a nav aid of some description at almost any destination and along any route in Alaska that you could possibly have any reason to go to, or use in any way. Victor airways are limited but being expanded.

When navigating with chart and compass don't spend much time looking for roads. There are few of value except in southwest Alaska. Remember there are no major cities, few communities and military airfields which are not located on the coastal waters or along one of the major rivers. There are only two or three airports with hard surfaced runways of any size at elevations above 1000 feet. VFR cross-country between any of the major airports can be accomplished at 4000 feet and above. Late editions of the WAC charts are quite accurate for the Alaskan area.

You will be amazed at the number of radio stations. Nowhere else in the world will you

find so many small communities which have air-ground communication—know how to use it, and know how to convey information of a vital nature for air-craft in flight. On airways and at MEA you have almost continuous communications with the ground. Sometimes if you feel you want additional weather information for a certain area, route or destination, try contacting the local airline operations representative and you may be surprised at the type of detailed information or words of wisdom he will have on hand or can easily obtain for you.

Survival

Pilots are not expected to fly, nor should they fly, in strange or new areas without preparation. Great effort has been expended to make available to any military pilot, information and indoctrination on what to do and what not to do in northern survival situations.

May we make a few suggestions: During the summer season be prepared for insects. The mosquitoes and "no-see-um's" (tiny, biting midges which produce a sharp burning pain all out of proportion to their size) can be the greatest immediate problem to confront you and it takes only a minimum of equipment and precautions to obviate the hazard. During the summer months along the Pacific Coast of Alaska there are many active glacier streams. Beware of them. They have a history of being very treacherous and unforgiving to the unindoctrinated and unsuspecting. In the same areas as the glacier streams are the Brown Bear. As a hazard they rate after the rivers. If you question this try hunting one and see how wary they are of man. Give them a wide berth if you see them. Don't surprise them. *Do* make lots of noise (loud talking or rattling a rock in a tin can) to give them a chance to move out of your way. There are exceptions but very few unarmed people have ever gotten in trouble with the big Alaskan Brown Bear.

In the winter, your biggest and foremost problem will be the low temperatures. Above all, keep dry. Don't even work up a sweat. If you do get wet or your clothes become damp the first order of the day is to get dry.

Flying in Alaska can be a rewarding experience and if you doubt whether you would want to fly the Far North, you are either getting old or have lost your spirit of adventure. Alaska is one of the States, populated with friendly English-speaking people, and the scenery is second to none in the world. If the doubt is still there, you might consider the great number of private, and even student pilots, who fly all over the country. It isn't as foreboding a country as you might expect at first. ●

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BETTER Wx ADVISORIES PROMISED

THE "Flash Advisory" 1960 style is a bit different from the flash advisory of 1957 when the Weather Bureau, in cooperation with the FAA first inaugurated the service experimentally.

Accuracy and timeliness of flash advisories are perhaps the two innovations in which pilots are most concerned. With radar weather reporting now increased to over 75 locations throughout the country, mostly to the east of the Rocky Mountains, and with new and more powerful radar being installed, bringing the total coverage to a network of approximately 100, the "weather watch" capabilities of the Weather Bureau will be substantially improved.

Also, in cooperation with the FAA, the collection of pilot weather reports for use at aviation forecast centers will be increased significantly. More radar weather and pilot weather information requires additional forecast personnel to analyze and translate the information into terms of forecast and advisories. Additional personnel are being placed at forecast centers for this purpose. With these additional resources available to the Weather Bureau during 1960 the effectiveness of the flash advisory service in terms of accuracy and timeliness should be materially improved.

Changes in substance of the flash advisories may not be outwardly apparent except to those pilots who have objected in the past that flash advisories seemed to be issued by the "basket full." This criticism was perhaps warranted to some extent, particularly in cases where conditions of low ceilings and visibilities set in and persisted hour after hour and sometimes day after day during which time successive "flash" advisories were issued with clockwork precision. The system is now designed to eliminate repeated advisories on persisting low ceiling and visibilities. It is believed that pilots will welcome this change.

Perhaps pilots would like to have a brief refresher on the scope and content of flash advisories: The Flash Advisory Service is intended specifically to give airmen in-flight advance notice of impending weather developments or trends that are potentially hazardous. The service is for all pilots, civil and military, as a common-system flight weather safety program.

Flash advisories are prepared by Weather Bureau FAWS Centers (Flight Advisory Weather Service Centers) and disseminated to FAA air traffic communications stations for broadcast to airmen in flight. Specifically, flash advisories are short-term advices covering the next 2 or 4 hours on weather conditions of the following categories:

(1) Severe weather such as tornadoes, thunderstorms, hail, dust storms, moderate to heavy icing, and severe to extreme turbulence (including mountain waves); and

(2) The initial onset of phenomena producing extensive areas of low ceiling and restricted visibilities.

The pilot may have certain questions concerning category (1): Is it intended that all thunderstorms be covered by flash advisories? *Answer:* Ordinarily advisories will not be issued in the case of scattered, unorganized air mass thunderstorms and their associated turbulence since these storms are readily circumnavigable. The pilot may also ask: What is meant by moderate to heavy icing and severe to extreme turbulence? Answers to these ques-

tions are given elsewhere in this article in terms of definitions used by the Weather Bureau in forecasting icing and turbulence.

With regard to category (2) flash advisories, pilots may ask: What is meant by low ceilings and restricted visibilities? *Answer:* As a general rule, the onset of ceilings of 1000 feet or lower and visibilities of 2 miles or less affecting the approach to 2 or more major airports in the same general area will be covered by flash advisories. Once the phenomenon has set in, however, continued advisories will not be issued because information on the low ceiling or visibility condition will be available to pilots in the scheduled half-hourly and continuous weather broadcasts on radio navigational channels.

Getting back to the question concerning the intensities of icing and turbulence, pilots may find it helpful to know the definitions applied in forecasts issued by the U.S. Weather Bureau. In establishing such definitions, it is recognized that descriptive terms applied to icing and turbulence are dependent to a large extent on non-meteorological factors such as aircraft size and type, airspeed, design strength, and, for icing, the design and operational condition of de-icing and anti-icing equipment.

In using the descriptive terms given below, forecasters consider them as meaning the intensities that commonly apply to transport-type aircraft of the DC-3 category or heavier and *that other users of the forecasts will need to evaluate intensities of icing and turbulence on the basis of the operational limitations of their respective aircraft.* Definitions used by forecasters are as follows:

Icing

Light—An accumulation of ice which can be disposed of by operating de-icing equipment, and which presents no serious hazard. Light icing will not cause alterations in speed, altitude, or track.

Moderate—An accumulation of ice in which de-icing procedures provide marginal protection; the ice continues to accumulate, but not at a rate sufficiently serious to affect the safety of the flight unless it continues over an extended period of time.

Heavy—An accumulation of ice which continues to build up despite de-icing procedures. It is sufficiently serious to cause marked alteration in speed, altitude, or track, and would seriously affect the safety of the flight.—*FSF*

ALL PILOTS READ

FLIGHT NOTES

Course of Action

"It is regrettable that statements about a pilot's emotional instability or lack of general aeronautical ability are most frequently heard after the pilot has had a fatal accident. All pilots should be impressed with the fact that they should always make known any deficiency in a pilot to their senior officers as soon as it becomes apparent. The commanding officer must carefully consider whether a recommendation for a transfer or disposition board is appropriate. If the deficiency involves emotional instability or general lack of aeronautical ability, a transfer to any other type squadron is definitely not the proper course of action."—From an AAR endorsement.

It's a Fact

—Pilots who use rudder for minor lineup corrections rather than rudder and aileron should also be aware that a skid will increase the sink rate if not compensated for by more power.

—All pilots should be aware of what can happen if the canopy goes at high speed and be prepared to take the proper corrective action. Duck the head and go on instruments while slowing down. If the eyes can be used at all, keep the artificial horizon centered and watch the airspeed. If the eyes can't be used, the only thing left is to pull the curtain over them.—*1st MAW "Wing Tips"*

Radar Departure

THE only honest answer that can be given to the question "How dependable is a radar departure?" is, "Not very."

Many crews drop their traffic watch to some extent after receiving a "radar departure," a promise of surveillance and notification of incidental VFR traffic which might be tooling around their neighborhood.

A recent incident occurred, in which a flight questioned radar departure's validity following a near-miss with a small aircraft. The FAA was queried and the following is an excerpt from the FAA's answer (a direct quote by FAA from the U. S. Manual or Radar Traffic Control Procedures):

"1.4 Additional Services."

"Subject to the provision of 1.4.4 of this manual, the controller will provide all aircraft operating on IFR flight plans with traffic information on all observed targets except when the Pilot advises he does not wish the service.

"1.4.4—It should be noted that many factors (such as limitations of radar, volume of traffic, controller work load, and frequency congestion), may prevent the controller from providing the additional services provided under 1.4. The controller possesses complete discretion for determining whether he is able to provide, or continue to provide, additional services in each individual case. His reasons for not providing or continuing to provide these services are not subject to question and need not be communicated to the aircraft."

In a mixed IFR-VFR condition there's still only one consistent protection and that is the crew's own visual awareness of what's ahead! (And on each side!)—*Flight Safety Foundation, Inc.*

Flight Violations

Recently a flight of six helicopters encountered lowering weather and landed at an en route airport other than the planned destination. Obviously the change in plan was the safe and appropriate thing to do. However, the flight entered the control zone of the alternate airport without first obtaining air traffic control clearance to do so, and a violation allegation was filed against the flight leader.

Command Responsibility

. . . Most landing accidents indicate a lack of skill or professionalism in bringing the aircraft down safely. This is not necessarily true, however, because the commanding officers thought these pilots demonstrated enough skill and professionalism to handle their aircraft safely or the pilots would not be out flying. For example, few commanding officers know how much real instrument training their pilots actually get. So the pilots get sent out on missions beyond their capability just because the progress chart shows they can accomplish it.

Numbers on the progress chart show that a pilot has 150 FMLPs and 25 CV landings, yet the pilot undershoots the deck because he pulls back on the stick close in to correct for a low. The quantity of approaches means very little. It is the quality that counts and this can only be determined by systematic instruction, monitoring, and continually supervising all pilots on all landings until no doubt exists that a pilot can land the aircraft safely under all conditions.

Safety is a Command responsibility. Landing accidents are avoidable. If landing accidents are to be avoided, they must be avoided through command action.

—ComNavAirPac Area Safety Council

Fam Foto

Some ASOs have been able to get their station photo labs to provide photographers to take movies of the first landings of new pilots in the "fam" stage. These are expeditiously processed and shown to the pilot the very next day. In this manner errors in technique can be pointed out. (All carriers do this filming on a routine basis and the ASO should be able to obtain the processed film.)

Three Engine Operation

On many intercepts and on some of our own flights a plane with one engine feathered will pass a suitable field in order to proceed to its scheduled destination. The remarks below are quoted from the "MATS Flyer," December, 1958:

"Loss of one engine is not just a loss of 25% of your power but represents a loss of 50% of your safety factor and is regarded in this light by the professional pilot. Continuation to destination on three engines has apparently become an accepted practice. A three engine operation is an emergency no matter how simple it may seem."

FLIP is Good for You . . .

. . . but if the Flight Information Publications in their present form don't measure up to your standards, there's only one way the FLIP folks can find out—and that's if YOU let 'em know!

Like the old adage says, it's the squeaking wheel that gets the grease, and the Hydrographer has to know what your squeaks are before he can set out to meet your needs . . .

To make your task of reporting corrections and improvements as easy as possible, pre-addressed post cards are available at all air stations; just fill one out, identifying clearly the FLIP you're referring to, indicate what's wrong and how you'd like to see it.

PICKLE OR PUCKER

DURING an operational hop in a P2V we were required to drop ordnance at intervals. Fifteen minutes prior to the first drop the checklist was reviewed and all preparations made. My first attempt to drop failed and a rapid check of the ordnance system followed.

When attempts to drop failed, utilizing all known switches, release buttons, and combinations thereof, my ordnanceman gave me a rundown on possible malfunctions in the bomb bay and requested permission to enter the bomb bay to check. I acknowledged his request but while he explained his intentions I reconsidered and told him not to enter.

I was too late. Unknown to me, in the intervening one or two seconds between the time he finished talking and I called to say no, he had removed his head phones and started for the bomb bay. At this point we were at 800 feet in light rain and patches of IFR. Drop time for the second run was 45 seconds away.

Having told the ordnanceman not to enter the bay (but not receiving an acknowledgment) my thoughts were now totally concerned with flying the airplane and trying to meet the drop time. My hand went to the bomb-bay handle and moved it forward. The plane captain's shout shocked me. "Joe just went into the bomb bay!" My hand never left the handle yet the bomb-bay doors opened 2/3rds of the way and then closed.

The plane captain jumped into the radar well to check and until I got the word my heart was sunk to the tip of my toes. I have never had a worse feeling. To think that I might have dumped a man from an aircraft into the sea, 800 miles from shore (as if he would even survive the fall). Fortunately he hadn't fallen and wasn't injured.

I feel there is a general lack of proper procedure for this type of thing, including the question of how important is it for anybody to even enter the bomb bay.

I have now instructed my ordnanceman as follows:

● He will not enter the bomb bay in flight unless there is a real

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Forms for writing Anymouse Reports and mailing envelopes are available in readyrooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

need. The drop in question was relatively important but only as training.

- There will be verbal agreement and acknowledgment without the use of intercom or relay through crewmembers. A face-to-face discussion eliminates a lot of assumptions.
- The pilot, plane captain, and ordnanceman are all responsible for ensuring that the bomb bay door circuit breaker is pulled.
- Anybody going into the bomb bay must notify the plane captain of his intentions as he goes through the deck hatch.

I have often smiled at some of the boners I have read and thought to myself, "How could anyone pull such an idiotic trick." Now I know. It's a hard job to be too safe or take too many precautions.

DREGS

AT A passenger stop the only service our R4Y needed was refilling of the ADI (water injection) tank as it was only about half full. Without water injection lower takeoff gross weights are necessary because of the reduced power available.

The flight mech contacted the NAS line crew and the ADI bowser was brought around to the aircraft. As the fluid began to be pumped aboard the flight mech noticed that the stuff flowed more slowly than usual. It is normally a 50-50 solution of distilled water and methanol and any increased viscosity is apparent. When the aircraft tank was full the mech checked the fluid by draining a sample into a cup. He brought it into operations and delivered it to me.

The mixture was muddy grey in color (should be clear) and it smelled like gasoline. It was so dirty the bottom of the cup could not be seen and it appeared to be a mixture of ADI fluid and very dirty gasoline. I ordered the tank drained completely and notified the Ops duty officer. Our flight was bugged by a wheels in the well at the time and though I was interested in finding out what sort of goop had been put in the airplane, I was not able to investigate further.

The R4Y system is such that if the ADI is turned on but does not deliver fluid, the fuel air mixture at high power settings is too lean to develop power. It is thought that in this case there might have been enough clean fluid in the lines for takeoff but with the possibility of engine failure as soon as the clean fluid was used up. Our alert flight mech quite possibly saved our bacon that day.

SICK ENGINE

PASSING through 25 thousand feet on a radar monitored climb to on-top, the oil pressure gage in my FJ-4B started fluctuating. Small fluctuations in the four-baker are not uncommon so this didn't cause too much concern. I still had a long way to go before getting into sunlight, the tops were forecast to be 41 thousand, so I kept climbing.

At 30M the RPM fell rapidly to 96 percent. This put a different stress on the affair. My decision was to continue to on-top then shift to MANUAL fuel. However, at 36M the oil pressure suddenly dropped to a big fat ZERO.

A change in plans was required now. I retarded throttle smoothly to 86 percent and told approach control my troubles, requesting an immediate Tacan/GCA to the air station. At the same time I started dumping some 4000 pounds of fuel to get down to landing weight. Along with this I began to think seriously about the weather on the ground. I had taken off into a 700-foot ceiling with visibility cut by rain and light fog. There was no use trying to kid myself. I was stuck with a low approach in a sick airplane—one which might not keep running long enough to get me to the runway.

Approach control was on the ball and provided positive, calm control to the approach fix. They even vectored me through a drop area enroute in case I wanted to get rid of my drop tanks. Pick-up by GCA was fast and positive. The only difficulty was in holding assigned altitudes with a heavy internal fuel load and only "moderate" engine RPM.

At one and a half miles I sighted the runway through the rain. On touchdown I secured the engine and normal braking eliminated the need to drop the hook for a field arrest-

ment. The time from "0" oil pressure to shutdown was 25 minutes. Any change in power settings after the loss of pressure would probably have resulted in engine seizure followed by ejection and destroyed aircraft.

An oil pump failure was the cause of my trouble but the bird was up in two days after a new engine was installed.

SLUSH

WHILE taxiing onto the runway for a night takeoff in an SNB the starboard engine quit. Because of my position on the runway I immediately restarted it and tried to move out of the way. It ran for about five seconds and quit again. Then I noted that no fuel pressure could be obtained by use of the wobble pump.

The port engine had remained normal but while I was talking with the tower, it too quit. No fuel pressure could be obtained on either engine. While being towed back to the line we had time to try and figure out what might be wrong. Engine runup had been normal. Carb air had been applied for a check and then returned to cold position. At the time the outside air temperature was 28° F., with relative humidity about 28 percent. At the time the engines stopped the port carb air temp read —15° C. and the starboard gage read 15° C.

On the line both engines were restarted and both ran normal on all tanks; they had been on left main at the time they stopped. Because there was no clear indication as to what was causing the trouble we decided not to fly that particular plane that night. Meanwhile the line crewman kept poking around and when he checked the main fuel drain a strong hissing sound of rushing air was heard.

Right then the vent line was checked and found to be clogged with ice. Vent lines and drains had not been examined on preflight but the cause was probably the result of taxiing out for takeoff. We had been forced to run through some patches of ice and snow and the prop wash or splashes from the tires apparently deposited enough slush on the vents to ice them over.

I recommend preflight check of vents and drains and where possible the avoidance of taxiing and engine runup in snow covered or slushy areas. ●

Snow Removal

The subject of removal of snow from the runways was brought up by the Adak Area Safety Council. It reports that although the overall effectiveness of the station's runway snow removal has been very good, certain conditions have presented problems. Most trouble is incurred during periods of extended wet snow falls which are associated with intermittent rain. This phenomena forms a dense layer of slush on the runways, which is most difficult to cope with. The snow removal equipment does not remove the slush well and in some conditions, freezing weather ensues before completion and the runway is left very rough with frozen ridges and vehicle tracks.

Vehicle breakdown also seems to skyrocket during removal under these conditions. In several cases it has proven beneficial to leave a reasonably thin layer of slush on the runways rather than attempt a removal. This has proven to be especially true when warm conditions are reliably predicted.

From experience gained this past winter, the following recommendations are made:

► Commence removal of light snow when a depth of three inches has accumulated and the duration is unpredictable.

► Commence removal of slush when two inches has accumulated and continue removal until the conditions end.

► Remove snow from all runways and all aircraft operating areas each time that removal from any area is required.

► Place the full decision of when to commence snow removal upon the Operations Duty Officer or his immediate supervisor. Requests for snow removal on the airfield should be made directly to the Public Works Department Duty Officer.

► Airfield snow removal equipment should be retained for use on the airfield, except when required for emergency conditions.

► Snow removal equipment should be maintained on a priority basis during the entire winter season.

Note: The Bureau of Naval Weapons is procuring two "SIGARD" snowmaster runway jet brooms, model SW-112, for test and evaluation. The RCAF report on this machine indicates that this machine is highly satisfactory for removing light snow from airfield runways.

Have a problem, or a question? Send it to

headmouse

Wants A4D Gear-Up Landings Info

Dear Headmouse:

Recently this Group suffered a casualty when a pilot landed an A4D aircraft with an unsafe gear indication. The left main gear collapsed upon landing and the aircraft departed the runway, hit a construction ditch and exploded into flames. The pilot evacuated the aircraft, however, but died because of asphyxiation and burns. The cause of the accident was the activating piston nut breaking off preventing the piston from fuel travel.

This aircraft accident precipitated a very detailed discussion of gear-up landings in the A4D. This Group normally operates with external fuel tanks and it was concluded from accident briefs and your landing accident statistics that landing on empty tanks on a foamed runway into arresting gear was an acceptable procedure that would cause minor damage to the aircraft and no injuries to pilots. However, the statistics that I hold give little information on a gear-up landing on a foamed runway into arresting gear without external tanks.

Please send me all the information that you have available on gear-up landings of aircraft without external fuel tanks that are equipped with fuel carrying wings similar to the A4D. I am particularly interested in information on the fire hazards involved, the success of hook engagements landing in this configuration and the recommended type of approach when engaging the arresting gear; landing short of the gear and sliding in or making a flying engagement.

I will certainly appreciate your assistance on this problem and am awaiting your reply.

A. O. SCHMAGEL, LtCOL. USMC
1st MAW

● The A4D summary is now in the mails.

Very resp'y,
HEADMOUSE

Wants Single Compass Manual

Dear Headmouse:

. . . Re: the note by Headmouse to a letter submitted by Lt. (j.g.) Rimson concerning compass swinging (Sept. 1960 APPROACH). This has long been a sore spot for the Wing out here and the attached letters, one from the wing to ComNavAirPac explaining the difficulties a unit experiences in complying with from two to six directives on one subject and the other is ComNavAirPac's answer which does not seem to agree with Headmouse's interpretation concerning the swinging of compasses.

I want to thank Headmouse for opening a door to discussion of the whole multiple directives system and I am sure that there are many thousands of other maintenance personnel who will jump at any chance to assist in discarding this cumbersome and frustrating directives system. One manual on compasses with all the information concerning any maintenance of those compasses is all we need; then we will know what we are supposed to do.

C. T. PERKINS, M/SGT
Wing Aircraft
Maintenance Chief
3rd MAW

Rudder Function

Dear Headmouse:

The following excerpt from a Navy training course for airmen appears to be somewhat in error.

"The rudder is a movable control surface attached to the vertical fin . . . and to turn the airplane to the right (the pilot) moves the rudder to the right. The area of the rudder protrudes into the airstream causing a force to act on it. This is the force necessary to give a turning moment about the center of gravity which will turn the airplane to the right . . . The main function of the rudder is to turn the airplane in flight."

E. S. SISSON

CCA School, Nas Olathe

► Technically the quoted material is misleading. Used by itself the rudder does produce a yawing moment rather than a turn. The airplane can only turn when the wings are banked but using the ailerons by themselves also produced an unbalanced condition. The proper technique is embodied in the old Pensacola chant:

"Stick and rudder,
"Stick and rudder,
"Don't use one,
"Without the other."

Very resp'y,
HEADMOUSE

One of the latest publications out of CNO's aviation training division is "Aerodynamics for Naval Aviators," written by Harry H. Hurt, Jr., Head Engineering Section, Aviation Safety Division, University of Southern California. Issue will be made to all naval activities and units in limited quantities. Besides an extensive Index and Reference List, the book contains six chapters—Basic Aerodynamics, Airplane Performance, High Speed Aerodynamics, Stability and Control, Operating Strength Limitations, and Application of Aerodynamics to Specific Problems of Flying. Individuals desiring a personal copy of this complete manual can purchase one from the Government Printing Office. Price is $3.25 and the GPO catalogue number is "D 217.2:Ae 8."

LIFE VESTS

Every time you fly over water—ocean, lake or river—your life vest becomes one of your most important pieces of personal survival gear.

A study of 88 water survival cases during the period from 1 August 1958 to 1 May 1960 showed the following life vest difficulties were most frequently reported:

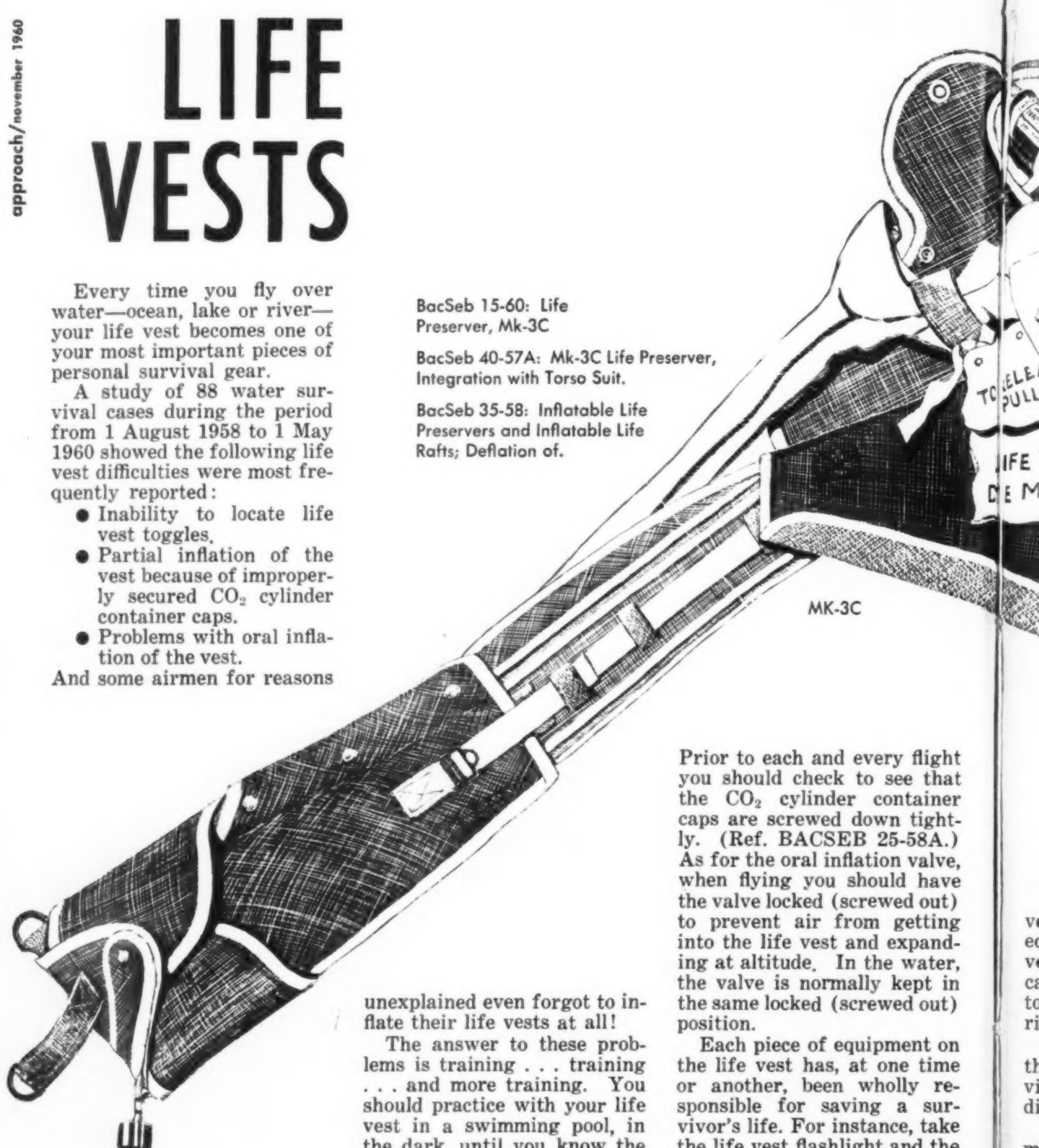
- Inability to locate life vest toggles.
- Partial inflation of the vest because of improperly secured CO_2 cylinder container caps.
- Problems with oral inflation of the vest.

And some airmen for reasons unexplained even forgot to inflate their life vests at all!

BacSeb 15-60: Life Preserver, Mk-3C

BacSeb 40-57A: Mk-3C Life Preserver, Integration with Torso Suit.

BacSeb 35-58: Inflatable Life Preservers and Inflatable Life Rafts; Deflation of.

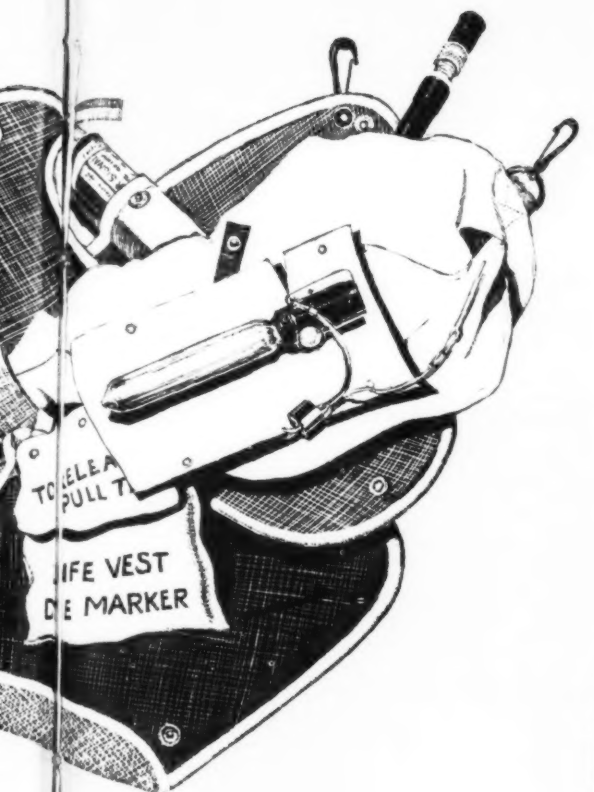


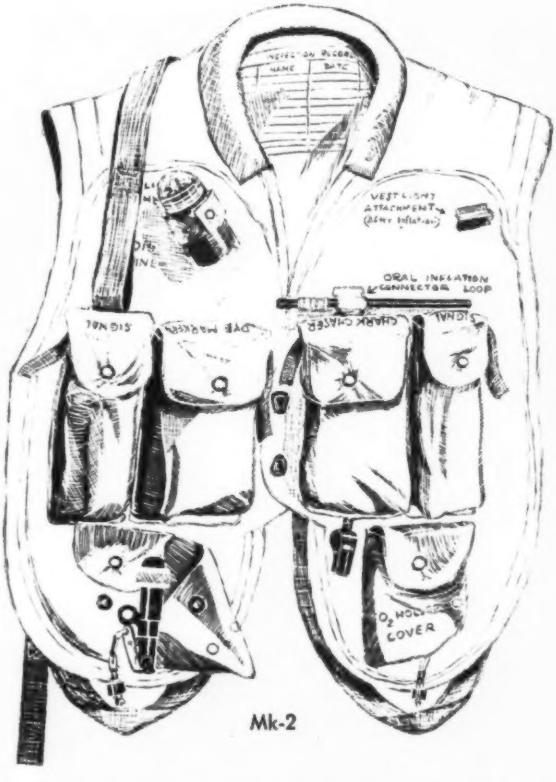
MK-3C

The answer to these problems is training . . . training . . . and more training. You should practice with your life vest in a swimming pool, in the dark, until you know the location of the inflation toggles and each piece of equipment without even thinking.

Prior to each and every flight you should check to see that the CO_2 cylinder container caps are screwed down tightly. (Ref. BACSEB 25-58A.) As for the oral inflation valve, when flying you should have the valve locked (screwed out) to prevent air from getting into the life vest and expanding at altitude. In the water, the valve is normally kept in the same locked (screwed out) position.

Each piece of equipment on the life vest has, at one time or another, been wholly responsible for saving a survivor's life. For instance, take the life vest flashlight and the whistle. (Although standard equipment on the Mk-2 vest, neither the whistle nor the life





Mk-2

BacSeb 31-59: Mk-2 Vest Type Life Preserver; Modification of.

BacSeb 44-54: Shark Chaser, Life Jacket, Instruction for Using.

BacSeb 22-58A: Vest, Life Pneumatic, Mk-2; Instruction for use, maintenance and inspection.

vest flashlight are standard equipment on the Mk-3C life vest. However, they could be carried in pockets sewn on the torso harness by a parachute rigger.)

In the last two fiscal years, there were 16 night water survival situations following a ditching or a water crash.

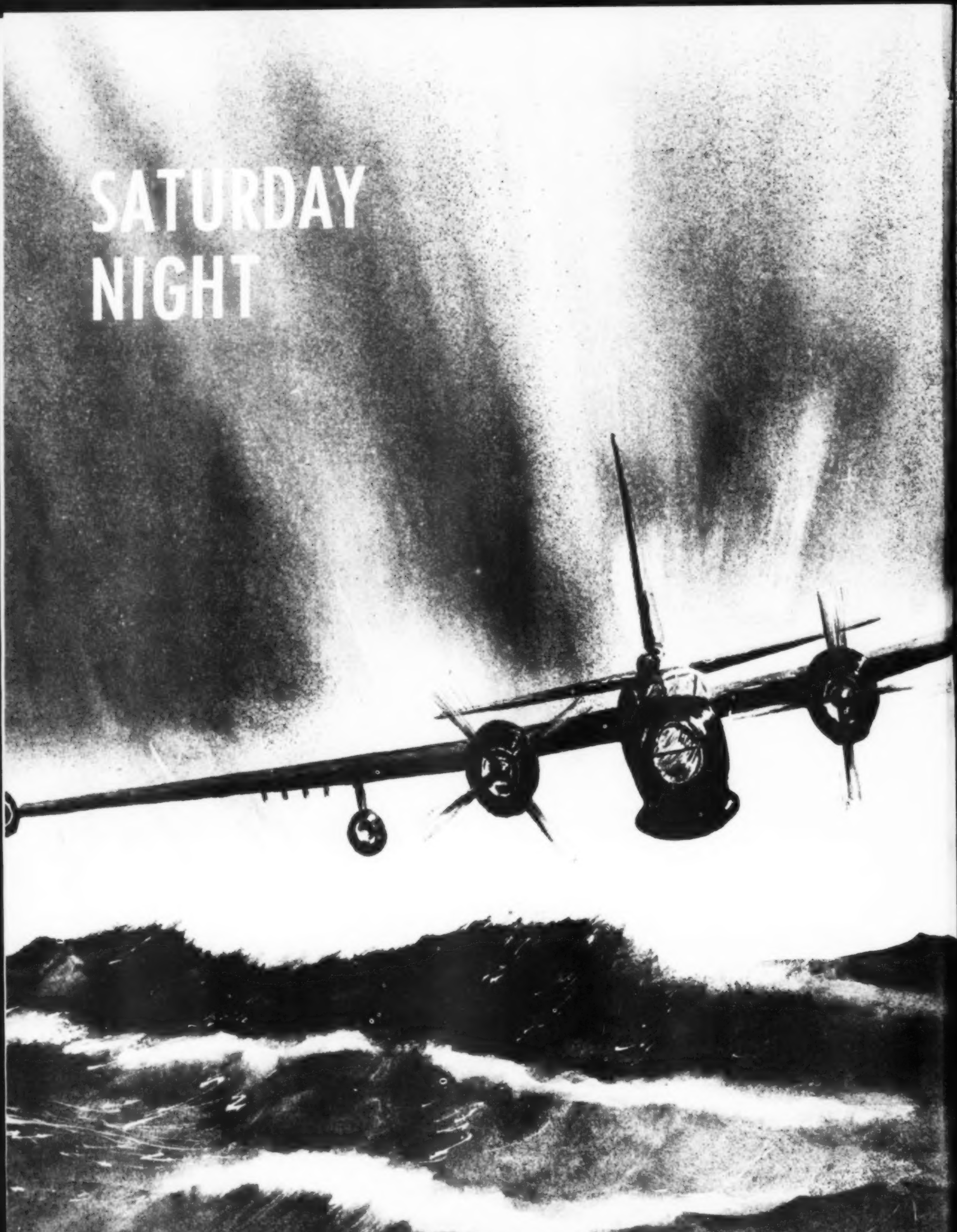
In five of these, the primary means by which the survivor was sighted and contact maintained throughout the rescue operation was the life vest flashlight. The light was reported sighted at a range of two miles by a ship and was clearly visible at five miles from a search aircraft at 1500 feet. Rescue boats reported in two situations that the life vest light was the only good reference that guided them to the survivor when rough seas were running.

In this same group of 16 survival situations, the whistle was used in six instances. One rescue submarine crew heard the survivor's whistle at a distance of two miles. An advantage of the whistle is that after it is heard it allows the rescuers to narrow the search to a smaller area.

Does your life vest have the prescribed modifications?

- Do you know how to use your life vest equipment?

- Do you wear your life vest when regulations and common sense tell you you should?


SATURDAY
NIGHT

NINE crewmembers finished preflighting the P2V-5 under an overcast sky. The midwinter day was cool with a fresh breeze blowing from the southeast. Yellow fuel trucks rolled away down the line. The *Neptune* was ready to go.

Life vests on, the crew lined up while the plane commander checked survival gear. Part of the crew boarded the plane. The radar-sonar operator and the radio operator went for an auxiliary power unit. The plane captain and ordnanceman stayed on deck to assist in starting the engines with the radio operator manning the fire bottle. Finally all the crew were aboard and in their normal stations. Taxiing to the runup area, they went through the runup check and then took their ditching stations. After a short wait for runway clearance, the plane was airborne. Takeoff time—1548—Scheduled local flight, VFR.

They headed south over the ocean. Below them, heavy swells flecked with moderate whitecaps rolled across the surface of the water.

Arriving at local area Foxtrot, the crew began practice radar runs for training. After sunset, they performed searchlight runs until approximately 1730 when the copilot relieved the pilot and simulated instrument training began. Later, they made an area familiarization from offshore at 2500 feet for the benefit of the fourth pilot who was new to the area.

At 1900, the plane commander ordered a practice ditching drill. The drill was uneventful except for the fact that the radio operator on bow watch was unable to man his ditching station when the trap door in the flight compartment stuck. Unable to unlock the hatch, he returned to his station and called the PPC to inform him of the trouble. The drill was secured at this time. The copilot worked on the trap door for 10 minutes before he was able to release it. As the radio operator came through the hatch, the copilot jokingly told him he was "dead." The radio operator was relieved on the bow watch by the ordnanceman.

In his beach apartment, a Marine observation pilot was getting ready to leave for a party. He glanced down at his watch, then at the black night pin-striping the bamboo blinds at the windows. The sound of the wind and light rain showers and the drone of an airplane somewhere over the ocean blended with the music of the hi-fi.

Aboard the *Neptune*, the clock in the panel read 1923. A transmission came over the UHF. The pilot tried without success to answer it and turned back to a heading of 300 degrees and get closer to the field. Minutes later the starboard engine began to surge.

Above the orchestra, the Marine heard an irregularity in the sound of the aircraft engine. After a pause of several seconds, it came again. He ran outside to the porch railing and saw the lights of an aircraft proceeding north. Except for the fact that the plane was quite low under the broken cloud layer, everything looked normal. He was about to turn and go back inside the apartment when the plane lost about 100 feet of altitude. As he watched, the plane dropped again several times, apparently flying level after each drop.

* * *

In the P2V's radio compartment, the radio operator heard the starboard engine sputter. Grabbing his helmet, he locked the hatch between the radio compartment and the after station and took his ditching station. He grabbed a parachute from behind the ECM chair and covered his face. The radar sonarman had earphones on and was relaying information to the radio operator and second mechanic.

In the pilots' compartment the plane commander and copilot worked over the fuel panel in a desperate effort to find and correct the trouble while the pilot maintained heading and airspeed.

The plane had oscillated when the starboard engine surged—then seemed to run all right until the engine started to cut out again. A few minutes after the starboard engine cut out, the port engine began surging. The aircraft lost all power. The pilot broadcast a *Mayday* and alerted the crew to stand by for ditching. The IFF was switched to emergency. (Later it was learned that neither the Mayday nor the IFF had been received by any facility in the area.)

At 300 feet altitude, the pilot called the crew over the interphone to "brace for impact," they were going to hit. Airspeed was controlled at 100 knots until impact. Ditching was performed without any power, with flaps and gear up, and bombbay doors closed.

* * *

As the Marine lieutenant saw the aircraft lose altitude again, he dashed back inside the apartment to get his field glasses. He was back at the porch rail in time to see a steady white light and a flashing red light go out on the dark horizon of the ocean.

* * *

The crew felt two jolts, the second more severe than the first. Back in the radio compartment, a slight third jolt was felt. The tail section of the aircraft broke away near the after station entrance hatch and deck turret plate.

The plane was dead in the water.

The pilots' compartment filled with water rapidly. By the time the pilot released the overhead escape hatch and exited, the compartment was completely filled. He swam to the port engine and from there to the empennage. The plane captain, who had been sitting on the tunnel hatch with his back to the 186 station at impact, escaped through the astro dome. He was followed by the copilot and the fourth pilot.

In the radio compartment, as the radio operator unbuckled his safety belt, the first wave of water came up to his chest. The radar sonar operator unlatched the escape hatch and walked out on the wing. Meanwhile, the second mechanic and the radio operator tried to get the Mk IV life raft off the wing spar but because the raft is designed for release from the flight deck compartment only, it would not come loose. The water was up to the radio operator's neck when he left the plane. The water was nearly to the overhead when the second mechanic climbed out of the radio hatch onto the wing. Standing on the wing beam, the three men awaited instructions from the plane commander. The PPC (who had been standing between the pilot and copilot and had not had time to put on his hardhat or assume his ditching station before the impact) had a deep cut on his cheek and his jaw appeared to be broken. Nevertheless, he was calm and firm with his orders.

The plane captain took a head count which he thought was nine. (Later it was determined that the ordnanceman in the bow watch had not been among the survivors. The aircraft accident investigation board concluded that either he did not receive the warning to prepare for ditching or that he could not open the flight deck entrance hatch to assume his ditching station.)

The plane captain pulled the fuselage raft release handle out five feet. Nothing happened. The MK VII raft would not come loose. The plane commander then ordered all hands to inflate life vests and swim away from the aircraft. Minutes later the *Neptune* sank completely from sight.

* * *

Back on the beach, the lieutenant had observed that the lights of the plane had disappeared on the horizon in a perfect line with one of the porch uprights and a bush on a nearby cliff. After phoning a crash report to the local police, he returned to the porch to take a magnetic bearing. A few minutes later he relayed the bearing to the police and his phone was connected with the Coast Guard's Air Sea Rescue Coordination Center on a "hot line" for search operations.

Out in the dark choppy ocean, the eight survivors tried to hold on to each other and stay in

a group but the water was too cold and the surf too high. The PPC gave the men their approximate position and instructed them to swim on their backs toward the lights on shore. From time to time, they shouted their names. Each man lighted the flashlight on his life vest. After about a half hour, the PPC called for help; the radioman swam to him and helped him stay afloat.

Meanwhile SAR operations had begun.

At the air station, a phone call from the county communications center at 1940 alerted the operations duty officer that a plane had gone down. Minutes later, the station SAR helicopter was airborne with the instructions that the tower would radio crash position data as available. While the SAR plane was enroute to the approximate crash site, the tower advised the crew that the search area was to be two miles west of the Point. The SAR plane took an east-west 180-degree search pattern immediately, flying at 25 feet with one searchlight directed ahead and one lowered to flood the area below. Some minutes later, the helo was advised of a corrected search area to the northeast of the Point. Shortly thereafter, the helicopter established radio contact with a Coast Guard UF also on the SAR mission.

* * *

About 10 minutes after the ditching, the survivors saw a helicopter searching close to shore. As they continued swimming toward the coastal lights, they saw other aircraft dropping flares in a search southwest of them. However, none of the survivors lit off a distress signal.

* * *

In one of the northeast bound search patterns, the pilot of the SAR helicopter was attracted by a strong flickering spotlight on the shoreline. In the hope of getting more accurate data on the crash location, he turned toward the beach to investigate. The spotlight was from one of the county sheriff's cars in the parking lot of a beach club. The helicopter's floodlights illuminated the automobile and two men standing beside it. The headlights of the car pointed in a southerly direction and the men gave the helo a two-finger signal and arm motion directing the plane to the crash site. The helo headed out over the ocean again in the new direction indicated.

At the search area, the UF was laying parachute flares. Although this facilitated the helicopter's search, the helo crew saw nothing. Shortly after the UF laid a second string of flares, the helo pilot saw what he thought was a flicker of light on the water. Seconds later he saw several lights and then a night signal flare. In the helo searchlight, the rescue crew could see the survivors bobbing up and down in their inflated mae wests, their vest lights lit. Two of the men were floating face down in the water. In an area of about ¼ of a mile, the helo pilot counted seven lights. He made a quick stop at the first one. The crew-chief lowered the rescue sling and the pick ups began. The time was 2053. The survivors had been in the water approximately an hour and a half.

* * *

The Aircraft Accident Investigation Board concluded that the accident cause was fuel mismanagement . . . "either a deliberate selection of the emergency fuel system in contradiction to current directives or inadvertent selection which went unnoticed and uncorrected until fuel exhaustion occurred." A contributing factor was the failure of the plane commander to require the plane captain to maintain an hourly inflight engine and fuel management log in accordance with current directives, the AAR states.

The Board noted that all persons involved in the search and rescue operations performed their duties in a commendable manner and that the SAR action was expeditious and efficient.

The survivors, however, could have facilitated their own rescue considerably. Cause of death of the three crewmembers picked up by the life guard boat was determined to be drowning aggravated by exposure. Air temperature was 56° and water temperature, 60°.

The accident board concluded that the three crew members would have survived if any one or a combination of the following conditions had occurred:

- Had the survivors activated distress signals at regular intervals commencing shortly after the ditching. (At least one hour was spent in search for the survivors.)
- Had the Mk VII life raft inflated and not been damaged.
- Had the Mk IV life raft been taken from the aircraft. (Neither the navigator whose responsibility this is in the ditching bill nor the other crew members on the flight deck attempted to release the Mk IV raft cover. The second mechanic in the radio compartment tried to release the raft but because the raft can only be released from the flight deck compartment, he was unable to do so. The AAR recommends a dual release arrangement for the raft which would permit release from either compartment.)

The board recommended that more emphasis be placed on ditching drills and survival to insure that all hands immediately proceed to their respective ditching stations, be familiar with the ditching duties at all stations and with the proper use of distress signals.

COULD IT BE

Although the following article is directed primarily at VP squadron types, its lessons are equally applicable to all overland flights in cold weather . . .

By W. B. Marshall, ADC, USN

FAW-3, Arctic Overland Survival Training Unit, Brunswick, Me.

Every time you take off on a patrol during the winter months, you become a potential cold weather survivor. At least one of you who read this article stands a chance of finding yourself in just such a situation. If you were going to spend at least one night in the woods in the wintertime, possibly alone and with a minimum of food and equipment, would you consider yourself a good survival risk?

The scene could be the heavily timbered areas of the United States or the sparsely timbered regions of northern Canada and the Arctic. The test will be surviving in sub-zero temperatures with a minimum of food and equipment. You could be injured. You could be alone.

For the purposes of this article, however, let's make it somewhat easier and imagine you are down with your crew and, luckily, no one has any incapacitating injuries. You will, of course, find a few cases of frostbite . . .

YOU?

What should be done about frostbite, how serious is it and how would you recognize it? If you know the answers, fine. If you don't then you had better find out as frostbite is your most common cold weather injury.

How about exposure? Ever hear of the *buddy system?* Then of course there is shock, its symptoms and treatment. How would you decide which injuries to treat first if you had some serious ones? When was the last time you attended a first aid lecture?

Of course if you are a whiz at first aid then there wouldn't be any sweat on that score.

Fear, panic and depression tie in very strongly with cold weather survival. Could you cope with them?

After all of the aforementioned have been considered and controlled, you have started toward successful survival, psychologically, and that is a big step in the right direction. How about the physical side?

As it is cold and uncomfortable you will have decided that a shelter and fire are next. Which first? This, you say, depends upon how cold and uncomfortable you are. With a crew available and a bit of organizing, both could be accomplished at the same time.

Another decision—what type of shelter and how many? Will it be a one-man A-frame, a two-man lean-to or a three-man para-tepee? How are they constructed and what is the best arrangement? How would you lay out the fire bed and the bough beds? If you are unable to answer these questions, you'd better crack that *Survival Manual* again. Did you know, for instance, that any three shelters arranged to form a large triangle constitute an international distress signal when visible from the air?

You would, of course, have no trouble in locating dry firewood in wet weather or selecting the best type of twigs for the fastest fire in dry weather. Ever hear of feathersticks?

Have you ever attempted to start a fire with flint and steel? Matches may get wet and even if they don't, they won't last forever. It might pay off to practice *before* it becomes an absolute necessity.

Look back on what you have gone over so far and evaluate yourself. Do you still consider that you are a good survival risk? If your answer is *no* then it would be a good idea to review the manual again. If your answer is a truthful *yes* then you are a pretty good survival risk.

It does not end here, however, so don't break your arm patting yourself on the back just yet.

In your mind's eye you are, by this time, comfortably settled in your shelter with a warm but smoky fire going and time on your hands to think of what you should do next. As you are lying on your nicely constructed bough bed and enjoying the warmth of the fire and your sleeping bag, you realize that you haven't eaten. This being your first day of survival, what would you decide to do? Would you break open your emergency rations and eat or would you abstain from eating on the first day? If you decide on the first course of action then you had better re-read that part of the *Survival Manual.*

You realize, while you are lying there, that your next step would be to set out some ground-to-air signals. Where would you put them and how large should they be? What about the small card that is included in a pocket of your parachute harness? It gives all of the current ground-to-air signals and their meanings. Is there one in your harness?

There is also another very effective method of

Would you construct—an A-Frame, lean-to or a para-tepee for your shelter?

attracting attention through the construction and use of signal fires. These must be constructed in such a manner that they will produce a maximum amount of smoke in the shortest possible time in any kind of weather. Could you construct such a fire?

There are a lot of signaling devices contained on your mae west. True, some of these were designed for use in water survival, but could they be adapted to land survival? Even dye marker and shark chaser can be utilized. Do you know how?

More rescues have been attributed to the signal mirror than any other signal device including the radio. Hard to believe but true, nevertheless.

Up to this point you feel that you are doing pretty well. Imaginatively, you are down but not out. You have been confronted with and have successfully controlled cold weather injuries. You have a good shelter. Your fire is warm and there is an ample fuel supply at hand. The ground-to-air signals are set out. What next?

You know that you are going to have to eat eventually and that you should try to supplement your rations with some small game animals or birds. This requires some form of traps and/or snares. The survival kit doesn't include a rifle any more, and of course you are well aware of this. How are you on the construction of simple traps and snares? What types of game should you try to catch and what types are you most likely to catch? Are all fur-bearing animals edible? Are all birds edible? Nourishmentwise, what is the best method of cooking any game? More questions —but the big question is, *"Do you have the answers?"*

Another good source of food would be fish. Would you know how to construct a net from the inner core line of your parachute shroudlines? Got any fish hooks or lures with you?

Right about now you realize that you are quite

To be able to find dry fire wood in wet weather is a must. A properly constructed signal fire can sometimes mean the difference between life and death.

short on cooking utensils and other containers. Also you might like to have some extra equipment not provided for in the survival kit. These could be such items as extra mitts, shoes, snow goggles, snowshoes and other items to make you a little more comfortable. How would you stack up when it comes to making and designing some improvised equipment? The *Survival Manual* can give you some good ideas.

All of this time, of course, you have been camped close to but not inside your aircraft and after several days with no indication that you will be rescued, you decide that you will either have to attempt to walk out or move to a more desirable location. If you are in a group, who will make the final decision? What should be taken and what should be left behind? How should your rate of travel be decided? Finally, how is your cross-country navigation?

Questions, questions and more questions but all so very necessary . . . Necessary to be answered before the situation arises . . . So hard to answer after it becomes a reality.

As a final thought after you have satisfied yourself that you are a good cold weather survival risk, you might ask yourself just two more questions:

1. Do I have a personal survival kit?
2. Why haven't I thought about this before? ●

DISORIENTATION

OF ALL the various types of accidents, the most deadly is disorientation. It can strike the experienced pilot as well as the inexperienced. This is borne out by the fact that only relatively experienced pilots are sent out on night missions when the conditions are such that an instrument letdown is required. In the past six months six Navy/Marine pilots were fatally injured while in the process of making GCA, CCA, and TACAN penetrations, or an instrument climbout. All of these were at night and the conditions were anywhere from clear to a 400-foot ceiling. The conditions were known before takeoff and the pilots were considered qualified to fly under these conditions.

There is no substitute for realistic instrument training. But this is difficult and in many cases impossible to come by. Day mission single engine pilots are particularly short suited in instrument training and their night flying is limited. This situation obviously makes pilots susceptible to vertigo. But this is too obvious and we are prone to take the obvious upon which to base solutions rather than the intangibles. Vertigo is a physical and mental condition in which the pilot loses his mental horizon and either he, his airplane, or his surroundings are moving uncontrollably. The pilot must have two out of three horizons to prevent or combat vertigo, an actual horizon, an artificial horizon, and in both cases a mental horizon. The mental horizon is dependent on the state of mind. Anxiety, lack of confidence, and low fuel state team up to wreck a pilot's mental horizon and this is most prevalent at the end of a flight when an instrument approach is staring him in the face. Training will give confidence and relieve anxiety, but it will not put more fuel in the tanks or bring back the natural horizon, nor will it prevent that descent to low level.

The one thing that is missing under actual instrument conditions is the psychological advantage of a copilot, safety pilot, or chase pilot and the knowledge that peeking out or popping the hood will uncage the mental horizon. This is a highly important factor, in vertigo susceptibility. Simulated training does not eliminate this factor, but it does the next best thing. It gives the pilot the opportunity to experience various stages of vertigo and develop a technique for combating it. Only "under the hood" training will do this.

Probably the most important factor in combating vertigo is the *knowledge of what conditions are the most conducive to vertigo.* If pilots know what to expect, they can take added precautions to prevent it rather than be victimized by it. In practically all our cases of vertigo or disorientation, there was one thing present. The movement of lights. In three cases out of the last six, pilots were letting down from clear moonlit skies into a broken cloud layer. Suddenly the light was gone overhead and it was black above and below with lights from the ground flickering as the aircraft went in and out of openings in the clouds. Even without looking at the lights, it is hard to keep from being conscious of them. That is all that is necessary when there is no horizon. The lights are flickering in from one angle and when a turn is made, they flicker in from a higher angle. If the pilot gets the sensation that the lights moved instead of the aircraft, he has vertigo. The same thing happens if there is a single light or widely scattered lights and they are steady. If the pilot is more conscious of the light than he is of his artificial horizon and turns toward it, he may get the sensation that the light is moving up and he is flying level or even turning the other way. This is enough to panic the poorly trained instrument pilot and his reaction is violent.

There is one thing then that single engine pilots must do, whether they are experienced or not if they find themselves letting down into a cloud bank at night. *Attach the mental horizon to the artificial horizon and keep it there* with conscious effort and not let themselves be distracted by outside lights. If a pilot has to look outside for any reason, he should look at his artificial horizon FIRST, then look outside, then look back at the artificial horizon. If he is going to make a turn, he should watch the horizon until the desired angle of bank is reached and stabilized before looking at anything else and then look quickly back to see that it hasn't moved. Another trick is to go on instruments a few minutes before any penetration, especially if flying on a clear moonlit night. Even a Link trainer is more difficult to control the first five minutes. Finally, all distractions such as studying charts, writing on kneeboards, tuning radios, and cockpit checks should be completed PRIOR to letting down into an overcast. Many pilots get vertigo doing these things because of complacency. So there are many more cases of vertigo than those that result in fatal crashes.—*AirPac Safety Letter*

THE PILOT EQUALIZER

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notes from your FLIGHT SURGEON

Extremely Fortunate

"BOTH men (a pilot and a student pilot) were extremely fortunate to escape from such a serious accident (the crash of a T28B in a wooded area) with such minor injuries," the reporting flight surgeon states.

"Two articles of safety equipment played a large role here—the crash helmet and the harness system. From the pilot's statement, in which he says he felt his head bouncing from side to side against the canopy, it is obvious severe head trauma would have resulted if he had not had the helmet on. Also, the shoulder harness abrasions show the pilot was thrust forward with great force; undoubtedly he would have been hurled into the instrument panel had this not been locked. Fortunately he had foresight to make sure he had the lap belt and shoulder harness locked and tight before the crash. Also, it is fortunate he made sure the student had his harness system locked and tight before takeoff and reminded him to check it just prior to the crash."

Escape After A4D Water Collision

IN A partially controlled collision with the water after power loss in a mirror approach, an A4D-2 hit wings level, flipped over on its back and came to rest inverted. The 300-gallon external fuel tanks and the nose section broke free of the aircraft during the crash.

"About five seconds elapsed from the first indication of trouble to the impact with the water," the pilot stated later. "When the plane hit it flipped over and remained partially afloat. This gave me the sensation that the plane was sinking. As soon as I recovered from the impact, I pulled the ditching handle, observed the canopy blow free and began pulling myself out of the plane. For a short time, I was held back on my left side, probably by my personal connections.

"I pulled harder and reached for my knife which I carried on my torso harness," the pilot continues. "Just as I found my knife I broke loose and then I worked my way free of the cockpit.

"During the time that I was in the plane I had ample oxygen." (The pilot was wearing an A-13A oxygen mask with Hardman fittings and a Firewel mask-mounted regulator.) "As I floated towards the surface I pulled one of the CO_2 cartridge toggles on my Mk-3C life preserver; on surfacing, I pulled the other toggle. I saw the plane about 5 feet away. I swam off about 20 feet, discarded my parachute and paraaft kit without difficulty, then swam off another 20 feet. No oxygen was coming from my bailout bottle so I took off my mask. My oxygen hose had probably been disconnected from the seat pan hose as I left the plane.

"Approximately four minutes later, the helicopter picked me up and returned me to the flight deck."

The accident report states that this was the second known accident in which an A4D was ditched and the pilot had difficulty escaping from the cockpit. In both cases, the pilot was attached at some point on his left side and neither pilot was able to breathe bailout oxygen after clearing the cockpit while submerged or after surfacing. The AAR recommends that "a strenuous effort be made to determine the causes of these malfunctions and correct them as soon as possible."

Prepared for Emergency

"THIS particular S2F crewman has evolved in his own mind a plan of action covering most survival situations. He states that prior to each flight he goes over in his mind what he will do should this or that type emergency develop. When placed in this ditching situation, he already knew what he was going to do and this helped him to do it calmly yet quickly. His foresight in planning for an emergency saved his life."—*Flight Surgeon in MOR*

Exit From F8U

TWO F8Us collided at night on the ground. After the collision, one of the pilots pulled the emergency release D-ring alongside his right leg. This released him from the seat but not from the parachute assembly. He was not familiar with the force necessary to free the parachute and drag it with him so he thought that the release had failed. Finally, he freed himself by disconnecting the four rocket jet releases on the integrated harness. He had mistakenly thought that pulling the emergency release D-ring would fire a .38 caliber cartridge. The delay could have cost him his life.

Pilots should constantly review the function and proper use of their safety equipment. When flying with new equipment in a new plane, this information should have equal priority with emergency inflight procedures.—*Flight Surgeon, MCAS, El Toro*

Reliability

...the probability that a device will always perform the function for which it was intended

RELIABILITY study, reliability engineering and reliability testing have become major fields of technology.

While they are relatively new and not yet fully explored and understood, considerable progress has been made in the past few years. Contractors of weapons systems and their components are now required by the Department of Defense to have comprehensive reliability programs.

This month the Fourth Annual Navy-Industry Conference convenes to explore such programs. The theme: "Reliability with Economy—A Challenge."

Basically an open forum, the conference aims to acquaint key personnel of industry and the Navy with reliability objectives and to generate positive thinking on the solution of the reliability management—and its organization.

Spiraling costs of weapons and high losses due to material failures has a deleterious effect upon

combat-readiness. Naval Aviation Safety Center statistics show 657 major accidents occurring during the past fiscal year. These accidents took a toll of 268 lives and 359 aircraft—a total of 266 million dollars worth of aircraft destroyed or damaged. Of these, material failures or malfunctions were involved to some extent in 43 percent or 282 accidents. This represents a 25 percent increase over five years ago when the total overall accident rate was considerably higher.

Almost 75 percent of the material failures occurred in three aircraft systems. One of every six accident involved the engine, one of every ten involved the fuel system and one of out of every twelve involved the landing gear. Aircraft systems are composed of many items, each built to the highest standards of quality and workmanship. But when the systems are set in motion and the parts start to interact, deficiencies then become apparent. A component failure precipitates a system failure in all cases and quite often the lack of maintainability preciptates the component failure.

It is said that the engineering of effective, efficient aircraft is a series of compromises between such factors as performance, dependability, safety, *maintenance*, comfort, cost and inherent ability to accomplish the intended mission. The designer is charged with the responsibility of achieving a proper balance of these factors in order to furnish us with a suitable and superior product.

While the designer strives for a workable match between pilot and aircraft he must also come up with a workable match between the "average" mechanic and the aircraft. As one missile developer put it—average mechanic—that's a butcher, baker, college-trained man, ditch digger, genius; men who are bored, interested, alert, distracted, eager, tired, sick. A design for ease of maintenance has to take into account dirt, rain, ice, heat, cold, vibration, tooth-tingling shocks. And it has to cope with bored, curious, intelligent man who wants to take it apart to see how it works—confident that the "tuning up" he gives it will improve its operation and relieve a dull afternoon. This missile developer's conviction is that most field repairs reduce instead of enhance the reliability of the item "fixed." (For BuWep's approach to this problem see "Inspection Plans," next page—Ed.)

NASC analysis of accident and near-accident data finds that material reliability stems from (1) the material quality of the item's design and production, (2) from ease of maintenance of the item. While more is known about the area of material reliability, the magnitude of the maintainability area is not generally realized. Design for reliability *must* be accomplished with maintainability factors in mind.

Naval aviation has become too complicated, too demanding, and too expensive for us to live with dangerous, excessive or unnecessary maintenance deficiencies. The Navy Material Reliability Program, through the "FUR System," is designed to rectify such maintenance problems. Despite a contrary general opinion at the operating level, it can be flatly stated that the system is working.

The FUR system reports items of three general types: the Safety AmpFUR which is concerned with items of flight safety, the Urgent AmpFUR which is used for items of a critical nature or those which require excessive maintenance, and the routine FUR and AmpFUR through which unsatisfactory conditions and removals are reported.

A classic example is the T2J Handbook of Maintenance Instructions requiring the removal of the engine in order to perform the normally simple line service function of bleeding brakes. The first step, says the HMI, "Remove engine." Imagine the number of maintenance errors possible in this procedure!—not to mention aircraft down time involved. Through the FUR System this totally unsatisfactory maintenance condition was eventually changed (about one and one-half years later) when an easier way to bleed brakes was developed and approved.

Immediate results are achieved by the Safety and Urgent AmpFUR. This is particularly true in the case of the Safety AmpFUR, while the achievement of the routine FUR and AmpFUR is more subtle and far reaching. Its effect, in most cases, will never be seen on current aircraft. The routine FUR, however, provides the basis from which the contractor determines the reliability and maintainability of his product. In one sentence, "Is this part good enough to use on our next aircraft?" We, the operators, through the quality and quantity of our reports, determine to a large extent the validity of the contractor's conclusions. We must furnish reliable information, as good as "next year's" aircraft are supposed to be, or they'll never get off the ground.

The success of the FUR system is entirely dependent upon the information which is received and compiled. By using the prescribed FUR or AmpFUR, and eliminating procedural irregularities, this information will be utilized. Remember, if it Failed, if it's Unsatisfactory, if it was Removed or Repaired—FUR it! ●

In aviation, as in medicine, diagnostic accuracy is a prerequisite to remedial action — *Anon*

Is your airplane being overinspected? A study of aircraft inspection systems indicates some airplanes are being overinspected and underflown. The future promises a change in . . .

Inspection Plans

DURING the past four years, several modifications of the long standing "30-60-90-120" hour periodic aircraft inspection system have been authorized by the Bureau of Naval Weapons for evaluation and implementation. This has been done in an effort to obtain, by operational experience, the data required to develop an aircraft inspection program incorporating the optimum maintenance manhour per flight hour ratio. The accomplishment of this aim should effectively decrease "down time" for aircraft maintenance and result in increased numbers of operationally available aircraft.

The information obtained to date from these innificant enough on which to base plans for an spection evaluation programs is considered sig-

aircraft periodic inspection system that will meet operational and maintenance requirements for adaptability and flexibility. Therefore, no additional evaluation programs are contemplated unless lack of, or incomplete information should warrant further study. This is not intended to restrict those programs already in effect.

Summary of Program Evaluations. The several aircraft periodic inspection systems which have been, or are being evaluated, follow together with a brief discussion of the significant aspects of each:

60-Hour Inspection Interval. This method of scheduling aircraft inspection is basically an extension of the previous 30-hour interval. It was authorized by the Bureau of Aeronautics for initial implementation at the discretion of the Major Operating Commands and included all aircraft then on a 30-hour inspection interval. The 60-hour interval reduced the maintenance manhour per flight hour ratio by reducing the number of required inspections. However, "peaks" and "valleys" still remained in workload planning due primarily to the long accepted practice of conducting the entire inspection at one time. This also requires that the aircraft be out of service until completion of the entire inspection.

Incremental Inspections. This procedure divides the periodic inspection into small increments to be accomplished on a planned basis during shorter intervals of aircraft maintenance availability. It allows for the operational use of the aircraft between the inspection increments and effectively aids in smoothing the peak and valley workload condition. This inspection method has therefore aided in improving aircraft utilization. Incremental inspection does not, however, reduce the total amount of work required to accomplish a complete inspection. "Planned Progressive Maintenance," "Incremental Preventive Aircraft Maintenance," and "Progressive Inspection Plan" are the various definitive names given to this method of periodic inspection scheduling.

Calendar Inspection System. The calendar inspection system represents the greatest departure from previously established inspection control procedures. The scheduling of periodic inspections is planned primarily on a calendar basis (presently 90 days), using a flight hour limitation as the secondary controlling factor. This procedure enhances workload planning by enabling the operator to schedule aircraft periodic inspections well in advance of the due dates. Current reports on the Calendar system evaluation indicate reductions in maintenance manhours per flight hour ranging from 25% to 47%. This results from the fewer number of required inspections. The flight hour limitation was increased from 60 to 150 hours for one aircraft model being evaluated—an increase of 250%. Present information does not indicate any increase in flight safety discrepancies or parts replacement due to the increased inspection interval. Conversely, a trend has developed toward relatively discrepancy free operation during the last 40 to 60% of the time between inspections. This may be an indication of previous over inspection; however, this fact cannot be substantiated at this time. The greatest problem associated with the calendar system lies in the power plant area. Some engine models will tolerate the increased inspection interval—others are doubtful. It therefore appears that primary inspection control based on flight hours will apply to power plants which do not prove to be compatible with calendar scheduling.

The following actions are planned by the Bureau of Naval Weapons in connection with the Naval aircraft periodic inspection program:

A standard basic program will be developed for the scheduling and accomplishment of periodic inspections of naval aircraft. The program requirements will be so designed as to provide the required flexibility and adaptability for broad application. It is presently believed that calendar time will be the primary controlling factor whenever possible; with flight hour limitations as the secondary controlling factor. The advantages of each inspection method evaluated to date will be considered and incorporated into the basic system.

Periodic inspection forms (HIR) will be revised to accomplish their intended purpose with a minimum essential volume of paper work. Change to a reusable card system is indicated. Inspection requirements will be arranged so as to permit accomplishmnt of aircraft inspections on either an incremental or complete basis.

In order to aid in reducing "out of phase" work requirements, scheduling of periodic inspections and component replacements will, whenever possible, be arranged to coincide, and also to be compatible with established rework periods.

The present "intermediate-major" inspection will be eliminated, if possible, in favor of a periodic "operator" inspection to be conducted by aircraft custodians, and a "major" inspection to be conducted by the rework activity as a regular part of the planned aircraft rework.

Addressees were requested to furnish comments and recommendations to the Chief, Bureau of Naval Weapons (FMPP) to aid in the development of an aircraft periodic inspection program that will be basically acceptable to all operators of naval aircraft. 1 Sep 1960 is established as the target date for finalizations of preliminary program plans.—*BuWeps Notice 4730, 27 June 1960*

The combination of new engines and old oil coolers often results in . . .

METAL CONTAMINATION

DISASSEMBLY inspection of engines received at overhaul and repair activities after being prematurely removed for metal contamination, often reveals that a large number of these engines show no evidence of internal failure. For example, a review of R3350 DIRs for 1959 by ComNavAirPac indicates that a total of 45 engines given special investigation for metal contamination showed no evidence of internal failure.

Cost of time spent in shipping, investigating and processing of these engines ran well over a half million dollars. Efforts spent by the squadrons in uncanning new engines, depreservation, engine build-up, engine changes, and reverse processing by the overhaul activities resulted in an extremely heavy work load which adversely affected fleet readiness.

Substandard housekeeping and less-than-best maintenance practices were involved in this problem. The most prevalent items are as follows: contaminated oil trucks and pre-oilers, improper cleaning of aircraft oil tanks, failure to clean and flush out used oil lines and hoses, re-installation of dirty oil coolers, used oil lines and uncapped new lines mixed up and strewn out on the hangar deck in preparation for reinstallation, and engine tear-down and build-up being conducted in the same area without any indication that the old parts had been properly inspected or that contaminated accessories were rejected to overhaul.

► The proper practices are outlined in BuWeps GREB 165, Rev. A. Here, in substance, are practices which should be SOP:

► All lube lines being re-used from an old installation shall be properly flushed, blown out with air pressure, capped off and kept in a clean location until time of use.

► Ensure that the aircraft oil tank is properly inspected and cleaned as necessary prior to installation of the new engine even though the removed engine oil did not exhibit metal contamination.

► Conduct routine inspection of pre-oilers and oil trucks for evidence of contamination. Pre-oilers are often exposed to sand and metal chips, hoses dragged through dirt and placed back in the oil tank of the pre-oiler.

► Ensure *proper cleaning* of the engine main oil strainer in accordance with the handbook of service instructions. Spare strainers should be kept in a clean plastic bag until time of installation.

► Use new or newly overhauled oil coolers at each engine change. (It is possible to process through O&R customer service those low time coolers removed from engines not showing any evidence of metal contamination.)

► Review the engine build-up shop checklist to ensure that strict accountability is enforced in processing and handling of lube system lines and accessories to prevent contamination of a new engine.

► Check the strainers and sumps on all high time engines prior to removal to determine the state of the lube system.

Wouldn't conscientious use of the foregoing common-sense practices eliminate many unnecessary engine removals, reduce the workload and improve fleet readiness?

Log it, Man!

Too many engines are being received by the O&R activities with log books that have little or no information recorded as to the reason for removal. When an engine is removed and returned to overhaul because of metal contamination all available samples of the metal particles shall be properly packaged and shipped with the engine. An appropriate log book entry will be made which states reason.—*BuWeps GREB No. 165*

Hazards Peculiar To JP-4 Fuel

THE fuel-air mixture or vapor above the fuel level in tanks and vents or from spillage on ramp, clothing or rags will be combustible under most operating conditions of temperature, pressure and altitude. This is in contrast with vapors from gasoline or kerosene which would normally be either too rich or too lean and have a more limited combustion range for pressure, temperature and altitude combination, for sea level pressure. The temperature range for combustion of JP-4 vapor is very broad; about minus 8° F to plus 100° F. For aviation gasoline under the same conditions the combustion range is about minus 30° F to plus 14° F.

The enforcement of no-smoking regulations becomes doubly important in areas where JP-4 fuel is stored or transferred.

Grounding the aircraft to the fuel servicing vehicle and the vehicle to the earth will equalize the electrical potential between these units, but will not prevent the formation of an electrical charge which can produce sparks along the surface of the fuel. This type of charge can be minimized by avoiding splashing and excessive surface agitation during fueling operations. The possibility of static discharge is the most hazardous single source of ignition in handling JP-4 fuel.

Every precaution must be taken to keep ignition agents away from vents and filler caps. Extreme care must be exercised while removing or installing batteries and in locating and operating ground-power generators to prevent sparks near vents or filler necks. Connecting or disconnecting batteries or operation of ground-power generators will not be undertaken during fueling operations.
—HQDA, Wash. D. C. Msg. 082327z April 60

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WATER-METHANOL FOR TURBO-PROP ENGINES—On some turbine engines water or a water-methanol compound is injected into the compressor section to obtain increased power for takeoff, particularly on hot days. The primary function of this fluid is to reduce turbine inlet temperatures so that more fuel can be burned. Where used, methanol provides this additional fuel.

ADI is a water-methanol fluid, but just any piston-engine ADI cannot be used with turbo-PROP engines. Allowable limits of specific gravity are precisely defined by the engine manufacturers (in at least one case, to four decimal points). When in doubt, these limits may be readily checked with inexpensive, commercially available hydrometers.

Use of a fluid having a specific gravity above or below the specified limits means an excess of water or an excess of methanol, respectively. The former invites flameout and the latter, dangerously high turbine temperatures.

Cases are known where kerosene has been added inadvertently to water-methanol tanks. The hazard here is obvious, and all possible precaution must be taken against it.

Additives are not recommended. Corrosion inhibitors, lubricants . . . should not be blended with water-methanol without prior approval from the engine manufacturer.

Drums in which water-methanol is supplied must be handled with extreme care and carefully inspected for dents. Even a small dent can cause flaking of the epoxy phenolic liner, with consequent fluid contamination.

Stainless steel is the only ferrous metal immune to water-methanol's highly corrosive quality, as are brass, bronze and other alloys of copper. Neoprene hose is not affected, but clamps and fittings can be if they are not made of a compatible material. The fluid is destructive to some fabrics, solvent for some paints and enamels, toxic to the skin, and injurious to the eyes. In all cases . . .

Handle With Care.

Note: Turbo-JET engines generally do not use methanol, but require water with a high degree of purity.—*FSF, Inc.*

"Why?"

A recent incident was reported in the following manner: "Emergency abort gear engaged on runway when pilot experienced light smoke in the cockpit with high oil pressure." The description of the discrepancy, which caused this mishap, was: "The smoke in the cockpit and high oil pressure was caused by excessive engine pre-oiling prior to flight." No other comments were attached. This is all well and good, but, where is the rest of the report? *Why* the excessive pre-oiling? This practice would appear to be dangerous if it causes pilots to abort takeoffs. If the abort had not been successful, the pilot and the aircraft might have been lost. So, again, "*Why*" did this situation exist and *what* was done to prevent future occurrences of this type?

Reports are received daily with even less information than given above. The most important fact the recipients of your report (NASC, BuWeps, major commands . . .) can learn is "*Why.*" The purpose of submitting a report is to provide information which can be used in the Navy-wide accident prevention program. A great deal of the Navy's preventive information is gained from these reports and the analysis which accompanies them. If only the "*What*" is submitted, it is impossible to tell others how to avoid pitfalls.

The only possible source of information is from *you*, the unit involved. When a report is submitted be it an Incident, Flight Hazard, Ground Accident, FUR, or DIR, be sure it contains the *Why* as well as the *What*, *When* *Where* and *How*. The little extra effort it takes to provide the *Why* in the report may be the effort that will save the next guy's neck. ●

NIGHT RESPOTS—An accident board recently stated, "Hangar and flight deck collisions must not be accepted as an inherent part of routine carrier operations and that situations involving long working hours and darkened ship conditions require even closer-than-normal supervision from flight deck personnel to prevent accidents of this nature."

This brings up the question: Should not movement of aircraft on the flight deck at all times be under positive control of plane directors?

KAPOW!—Maintenance personnel and an A3D plane captain were filling the tail hook low pressure air bottle. The high pressure side of the air compressor was used by mistake and the gage exploded causing personal injury and aircraft damage. Corrective action taken by the reporting units included placing more emphasis on safety and correct maintenance procedures in their educational programs.

NO TRUER WORDS—Confucius say "Man who make mistake, fool. Man who make same mistake, damn fool." Here's the case of an HSS-1 being pushed tail-first down the flight deck. The plane director was steering the aircraft with the tail towbar. He began to turn the tail wheel to port. The momentum of the aft movement of the aircraft caused the tail wheel to be turned more to port and with an increasing rate of speed the director was unable to check the movement of the towbar so he let it go. The towbar swung around until it hit the underside of the fuselage on the port side tearing a 16-inch hole in the fuselage.

The accident board's investigation revealed 30 knots of wind down the flight deck at the time of the accident and that the plane director, alone, was unable to control the movement of the tail during the evolution. The board recommended that when winds over the flight deck are 25 knots or more, a tow tractor be utilized to move aircraft for positive control.

One hour and 15 minutes later, to the chagrin of those involved, a second accident occurred under the same circumstances resulting in the same type damage to the same model aircraft. This time, the board recommended the use of tow tractors *anytime* aircraft are moved underway on the flight deck.

Also noteworthy is this comment from the board: "It has been noted in previous ground accidents aboard ship when time appeared to be of the essence in handling aircraft, accident rates have increased sharply if not drastically. Therefore, in order to conduct flight operations and ground handling operations safely, it may require sacrificing an element of time."

WINGFOLD—An S2F-1 was being turned up for a routine check by a qualified maintenance man. After stationing one man at each wing butt, the plane director gave the signal to spread wings. The man at port wing butt failed to notice the locking pins go into the lock position at the start of the spreading cycle. When the wing was at the 45 position, he heard a loud crunch and immediately gave the signal to reverse the wing cycle. The fore and aft hinge pins had sheared before reverse cycle took effect and the wing panel was separated from wing butt.

The port outer wing panel was damaged at the following points: Upper and lower joint fitting assembly damaged beyond repair; electrical connections and de-icer turbine severed; butt rib buckled; locking strap and bell crank fitting bent.

Probable cause—The lock-lock cylinder on port wing butt froze preventing the lock latch pin from going into position. This allowed hydraulic fluid to pass through the locking line causing the locking pins to go into position at the start of the spreading cycle. All personnel concerned have been thoroughly briefed on the wingfold system and what to look for during the spreading cycle. During the cold weather months all A/C will have their wings spread as soon as they are towed out of the hangar.

STRUT SERVICE—If you experienced a flat tire on your car, what would you do about it? Although we can't deny that there are "them that would," not many of you would pump the tire up just to see if it would go flat again. Most of you would put on the spare, then have the flat inspected and repaired.

An airplane shock strut that goes flat isn't too different from a tire, except that oil as well as air is added to the strut. In the case of the tire, when it gradually goes flat there is a cause, normally described as a leak. Couldn't we deduce that if an airplane shock strut were continually going flat, there also must be a reason? And isn't it our job to find the reason and effect the repair?

All too often we fall short of our responsibilities in this regard. For example, during a single two-week period, one aircraft had its right main landing gear strut go flat 13 times. The flight

crews reported the flat strut in the log each time it happened, and on all except that last one the stock "fix" report written by the maintenance crew was either "serviced with air and oil," or just plain "serviced." The fourteenth and final action noted was, "Replaced strut seals."

Here's another case. One airplane experienced 10 delays and one change of equipment in two days because of a leaking left main gear strut. One Schrader valve and a Shrader valve seal were replaced, but to no avail. Finally, the strut seals were replaced and this corrected the difficulty.

If the strut fluid is leaking at the O-ring seal area, no amount of Schrader valves or valve seals will correct this situation. Early strut seal replacement is the only action that will nip this type of squawk in the bud.—*FSF, Inc.*

WANT TORQUE INFO—The Bureau of Naval Weapons recently established a project to develop a publication which will standardize methods for the use, maintenance and calibration of torque wrenches. In addition, the project will investigate all types of torque measuring tools now available to the Fleet to determine any inadequacies and recommend improvements.

The need for a publication governing the use, maintenance and calibration of the torque wrench was established following a study of aircraft accident causes conducted by the Naval Aviation Safety Center. The study revealed that during the period 1 May through 1 Sep 1959 there were 22 instances of aircraft damage resulting from improper torque application.

Two of these resulted in destruction of the aircraft and six resulted in substantial aircraft damage.

The estimated dollar cost of the occurrences exceeded $1,052,600. During the torque application study it was determined that there is not presently in existence a general publication which will guide and direct the maintenance men in torque application and in the maintenance of his torque measuring tools.

The ultimate goal of the Bureau of Naval Weapons Project is to accomplish the following:

1. Standardization of the torque wrench, in that, the external appearance of torque wrenches having the same application, is identical.

2. Standardization of the procedures for calibrating and testing of torque tools issued to the operating activities.

3. Provision a publication which will acquaint personnel engaged in the maintenance of naval aircraft with the importance of torque control, the proper procedures for applying and measuring torque and the care and testing of torque measuring tools.

Pending issuance of the Bureau of Naval Weapons Publication it is important that all maintenance activities be constantly alert for deficiencies in torque application instructions. It is requested that any deficiencies noted in existing instructions and torque measuring tools be reported to the Bureau of Naval Weapons and the Naval Aviation Safety Center for consideration during this project.

GROUND HAZARD—"Recommend that all carts of local manufacture be equipped with a suitable brake to prevent movement when used in areas not provided with tie-down facilities. Line and hangar personnel should be particularly vigilant and alert during periods of high winds, regardless of source: weather or other aircraft. Attention must be directed to the fact that any object, capable of being moved manually, is subject to possible accidental movement by wind forces. Such objects, if not adequately braked or chocked must be secured to the deck or other substantial fixtures, if they are to be left unattended for any length of time."—*From a FHIGA*

HIGH PRESSURE STUFF—A mechanic working on the line for another operator got flattened against the underside of an aircraft wing and was dead when he fell back to the ground following the bursting of a low pressure air tank that was being filled from a 3000 psi unregulated air source.

Don't fool with high pressure gasses or liquids unless they are properly contained and regulated with approved equipment that will prevent explosive forces from literally knocking you or your fellow workmans' head off. Don't cobble up makeshift plumbing or get in a hurry and take short cuts with a bunch of "spring-loaded" energy that's like dynamite and can work you over for keeps.

—American Airlines Maint. Ltr 60-25

LOUSED-UP FREON PACK—Airesearch found compressor wires reversed on a malfunctioning air conditioning unit. Wires T2 and T5 had been tampered with and were causing the compressor to operate backwards. They also mentioned in their letter that we were being billed $349.50 for parts and $1202.96 for labor—total $1552.46 to get this unit back in condition so it could blow cold like it should.

This running backwards caused the compressor

freon lubrication pressure to be low—resulting in the compressor overheating and tripping out of operation. The high compressor case temperature, due to low cooling, resulted in extensive damage to the compressor.

In addition, it was necessary to repair several external portions of the pack. The legs were bent and broken, the harness was frayed, several lines were damaged, and a magnetic amplifier was missing.

The reason stated on the papers for its shipment to them was "inoperative"—this is bold mockery in the light of the ignorance and brutality revealed by the true condition of the unit.—*American Airlines "Weekly Maintenance Letter"*

CANOPY CARE—Fluids such as kerosene, gasoline, mineral spirits and thinners should not be used to clean plastic bubbles or cabin windows. The use of such fluids will eventually cloud up the plastic and reduce its transparency. Your best bet is to wash the plastic with a mild soap and water.

Care should be exercised in rubbing down plastics—use of a chamois is desirable in that it will not scratch the surface. Don't use a dry cloth—this builds up an electrostatic charge which attracts dust. If you wear a ring remember to take it off to avoid the possibility of scratching the plastic.

COLD-WEATHER PROCEDURES—1. Check control cables and emergency gear extension cables for proper tension in accordance with a cable tension variation chart.

2. If fuel, oil, hydraulic, or oxygen leaks develop during cold-weather operation, correct them after the airplane has been in a heated hangar, if possible, so that fitting and O-rings will form a more positive seal.

3. Open fuel and oil sumps frequently and inspect them for water. At extremely low temperatures, any water in the fuel will form ice crystals, which will block the openings and clog the fuel filter. After engine shutdown, water may form in the lubrication system because of condensation. Drain fuel and oil sumps within 30 minutes after refueling or engine shutdown.

4. Keep airplane clean. The wheel wells and speed brakes should be free from dirt and excess grease.

5. Avoid use of airplane battery whenever possible, because battery output is greatly reduced by low temperatures. Use external electrical power to ground-check electrical systems.—*NAA "Service News"*

TOOL RULE—On the fifth low angle loft bombing run the AD-6 pilot failed to recover and crashed. He had called in commencing the run and had reported passing the 18,000-foot mark. This report was clear and normal in all respects. The pilot of the aircraft ahead was in his interval turn at 1700 feet and observed this aircraft in an inverted position about 400 feet below at his 2 o'clock position. It appeared that no attempt for recovery was made. The aircraft disintegrated and burned on impact. *A six-inch ½" open end box wrench was found in the wreckage.* Carbon monoxide poisoning was ruled out due to the coherency of the pilot's voice.

The primary cause of the accident is undetermined with the following possibilities:

a. Pilot technique

b. Malfunction of ailerons due to jamming

Board's Recommendations:

1. That the practice of observing loft runs of fleet replacement pilots be continued in order to correct any errors that may be noted.

2. That the importance of a *tool inventory list* be stressed periodically to all hands and that it be followed faithfully.

3. That pilots be continually briefed on the inherent danger of low altitude flying and the complacency that is apt to set in after becoming familiar with it.

HIR TAKES PRECEDENCE—BuWeps Notice 4730 of 16 December 1959 cites the Handbook of Inspection Requirements (HIR) as the governing document in cases of conflict with other maintenance directives concerning periodic inspections. Please be advised that any conflicts are to be reported to the Chief Bureau of Naval Weapons (FMTD-4).

BIG BOMB—The GTC-85 starting unit, mounted in a pod, looks like a bomb. With careless handling and lack of respect it may very well respond as one.

ROCK AND ROLL CONTROL—Here are a few maintenance tips which will prevent ground resonance in helicopters:

- ► Proper tire inflation
- ► Correct oleo strut inflation and operation
- ► Properly service main rotor dampers—uncontaminated fluid and correctly bled by the walk- through method.

MURPHY'S LAW*

AN A3D-2Q turn-and-bank indicator, part no. 1722-2BC-B2-1, was received from supply with plugs in all openings. It was installed improperly by connecting the pressure air line to the vent/vacuum opening and by *leaving the plugs in all of the other openings* (photo 1). This left the pressure air line connected to the wrong opening and no means of exhausting internal pressure from the indicator.

The previous day the pressure regulator part no. 98070J had been installed with the connections *reversed* (photo 2). This allowed high pressure air to flow through the regulator and into the turn-and-bank indicator unregulated.

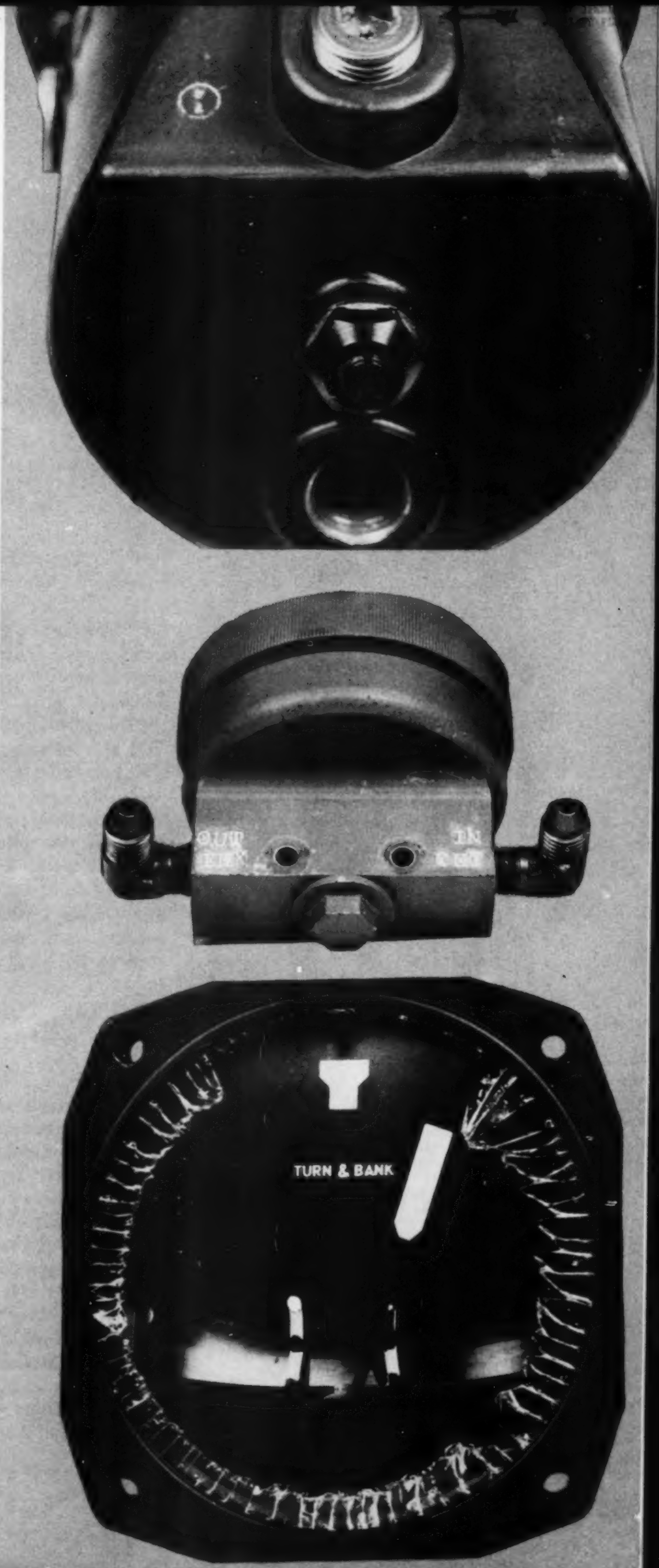
When the pilot applied maximum military power for takeoff, approximately 165 psi air flowed through the regulator and into the turn-and-bank indicator. The instrument's glass face shattered and blew out into the cockpit with great force (photo 3).

This is an example of "Murphy's Law" being applied simultaneously.

The operating squadron recommended:

1. The letter "P" be stamped by the pressure opening and the letter "V" be stamped by the vent/vacuum opening of the turn-and-bank indicator.

2. Drill the bolt holes by which the pressure regulator is attached to the airframe different sizes to make it impossible to install it reversed.—*Contributed by FAirReconRon Two*



Double Murphy—Top: Pressure line was connected to vent of turn and bank instrument. Middle: Regulator was "modified" to reverse in-out lines (note xing out of correct labels). Below: Pressure exploded face of instrument.

TWO more cases have been reported wherein the flaperette line and pitot static line were interchanged at station 284 of the F9F-8B during tail removal and reinstallation. On turn-ups this diverts hydraulic fluid into the airspeed indicator. In one case an instrument face blew out, injuring the plane captain.

The recommendations made in the Jan 1958 issue of APPROACH are still valid—color code the lines and establish a policy of breaking the flaperette line at quick disconnect instead of the fitting at station 284.

*If an aircraft part can be installed incorrectly, someone will install it that way!

CLIPBOARD

This Way Lies Madness

EMOTIONS play an important part in everyday life—they grow up with the individual. Physiologically, emotions stir up the body and cause certain "reorganizations." The more gentle emotions seldom figure in aircraft accidents. Violent emotions — fear, anger, hatred—prepare the body for increased efforts. Extra energy, endurance, and strength are unleashed. The autonomic nervous system takes charge; large muscles prepare to "fight, flee, or go for your gun," and smaller muscles which facilitate the co-ordinated skills such as FLYING become unco-ordinated, and movements get jerky.

There is no evidence to prove that thought processes speed up in periods of high emotion. However, there is a decrease in perception including sensitivity to pain and sensation of fatigue. The sensory organs narrow their range to such an extent that poor judgment is the frequent result.

If a pilot permits all the petty annoyances; e.g., congested traffic, wave-offs, poor radio discipline, TT-1s (T-34s), students (instructors); to pile up and "get his goat," he may replace a rational attitude with an emotional one. When this happens he becomes an accident seeking only a suitable circumstance to occur.—*BTG-1 "Plane Sense"*

Ready Rescue

IT IS particularly noteworthy that the rescue operation was conducted in a professional and orderly manner by all personnel involved. The rescue helicopter at NAS Mayport was airborne in a matter of minutes after the crash alarm was sounded. The expert assistance of the Imeson Radar operator in directing the helicopter was especially commendable, testifying to the high state of readiness of the air/sea rescue facilities at the disposal of pilots operating in the Jacksonville, Florida area.

—from VA-44 AAR 9-59

Lessons We Can Learn From Winter Accidents

In the past, preventable winter accidents have been caused by

- attempted VFR flights under marginal weather conditions
- conducting flights under situations that were beyond a pilot's qualifications, such as insufficient instrument experience
- improper clearance of flights into icing conditions when aircraft did not have adequate anti-icing equipment, or to a destination with an alternate forecast below prescribed weather minimums
- clearance of aircraft by commanders or pilots with clearance authority for destinations where non-operative navigational aids or runway conditions made landing extremely hazardous
- inadequate preflight planning, briefing, and preparation for flight.
- lack of proper enroute and destination monitoring by supervisory personnel
- failure of pilots in flight to utilize existing pilot-to-forecaster weather service, coupled with inaccurate weather forecasting.

Positive, timely action by commanders, flight safety officers, and inspectors will prevent repetition of similar accidents.—*SAC Safety Memo*

WELL DONE!

LIEUTENANT E. M. STONE

USS RANDOLPH (CVS-15) was docked at Quebec City, Canada with Helicopter Anti-Submarine Squadron SEVEN on board. One of the squadron pilots, LT E. M. Stone, was out on a local four-hour engine run-in in an HSS-1 helo.

The first hour or so of the flight went by quite peacefully, but then a complete loss of throttle control occurred and up went the engine RPM. All attempts to close the throttle were futile and engine overspeed was imminent.

The pilot correctly analyzed the emergency and applied additional load on the engine by use of up collective. This effectively prevented the overspeed but the increase in lift produced excessive airspeed. A climb at 1500 feet per minute was commenced to hold the airspeed within limits.

Upon reaching 5500 feet and a favorable position over Quebec City Airport, LT Stone secured the engine and executed an autorotative landing. All this was accomplished without injury to personnel or damage to the engine and rotor system.

His professional know-how and decisive action in an emergency have earned for LT Stone a resounding WELL DONE.

Whether Democrats or Republicans win the Presidential race the Aviation Safety Platform for Fiscal '61 is to reduce to an absolute minimum the tragic loss of life and equipment by preventing aircraft accidents in naval aviation.

PLANKS

1. Aircraft accidents are *caused,* therefore they can be prevented.
2. Aircraft accidents are not an "inevitable" result of military aviation.
3. The most effective aviation outfits in the Navy are invariably the safest.
4. The skills needed to fly effectively are the same skills needed to fly safely.
5. The sole purpose of accident investigation and reporting is accident prevention. We can and must profit by our past mistakes.
6. The development of safety consciousness among aviators is an intrinsic part of our mission.
7. Safety is everybody's business. An effective program requires effort on the part of every individual.
8. Quality control and safety are synonymous. Each and every man doing aircraft maintenance work is in a position to make or break a safety program.
9. The plane captain and other line support personnel can make a real contribution to Aviation Safety.
10. Our Aviation Safety record can and will be improved.

—An adaptation from CNAVANTRA